Langage C

Introduction

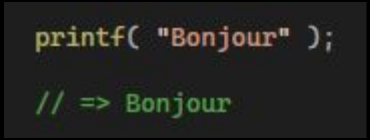
vs

Introduction

-Compilé
-Bas niveau
-Typé
-Gestion manuel de la mémoire

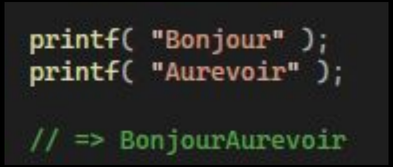
-Interpreté
-Haut niveau
-Dynamiquement typé
-Gestion automatique de la mémoire

Sortie



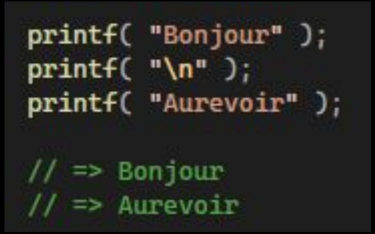
```c
printf( "Bonjour" );

// => Bonjour
```

Sortie

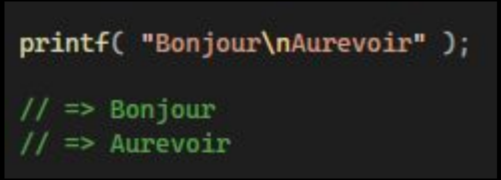


```
printf( "Bonjour" );
printf( "Aurevoir" );

// => BonjourAurevoir
```

Sortie

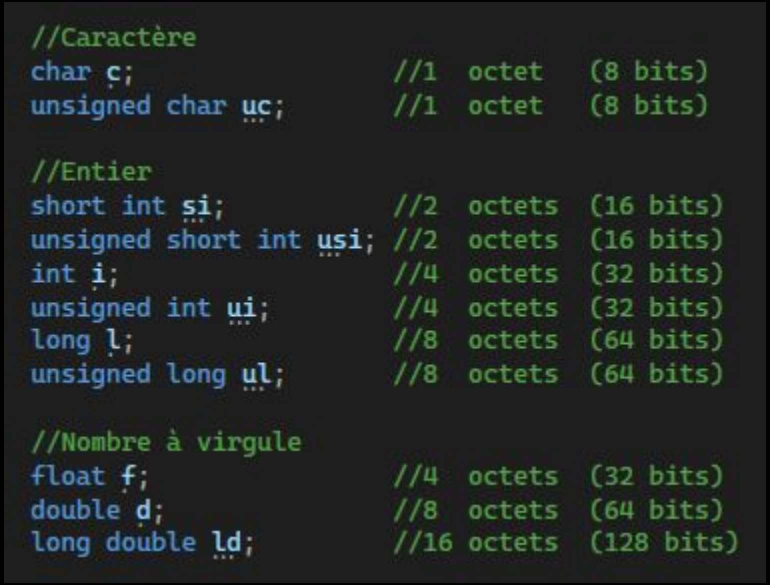


```c
printf( "Bonjour" );
printf( "\n" );
printf( "Aurevoir" );

// => Bonjour
// => Aurevoir
```



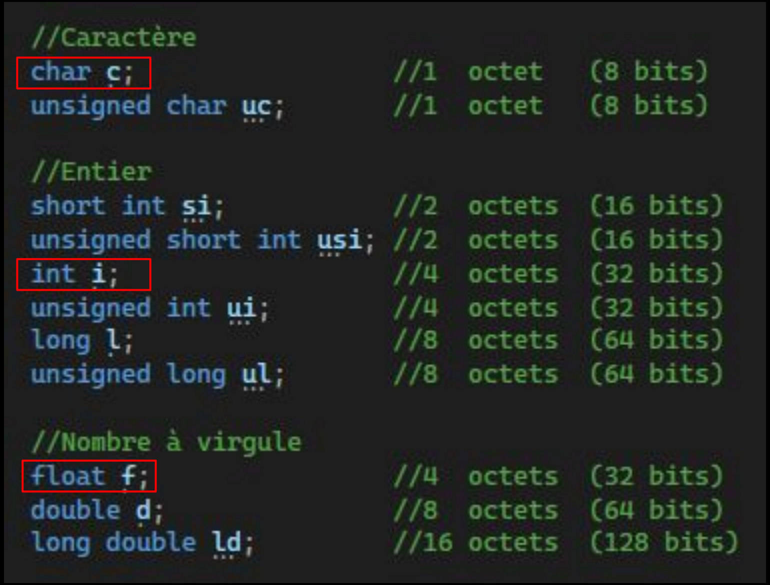
```c
printf( "Bonjour\nAurevoir" );

// => Bonjour
// => Aurevoir
```

Les types



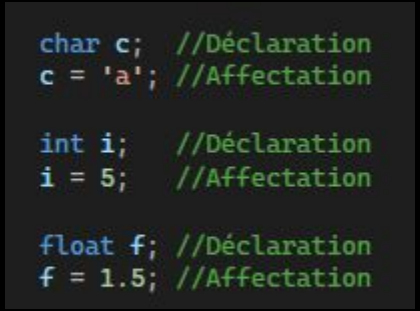
```
//Caractère
char c;                  //1  octet   (8 bits)
unsigned char uc;        //1  octet   (8 bits)

//Entier
short int si;            //2  octets  (16 bits)
unsigned short int usi;  //2  octets  (16 bits)
int i;                   //4  octets  (32 bits)
unsigned int ui;         //4  octets  (32 bits)
long l;                  //8  octets  (64 bits)
unsigned long ul;        //8  octets  (64 bits)

//Nombre à virgule
float f;                 //4  octets  (32 bits)
double d;                //8  octets  (64 bits)
long double ld;          //16 octets  (128 bits)
```

Les types

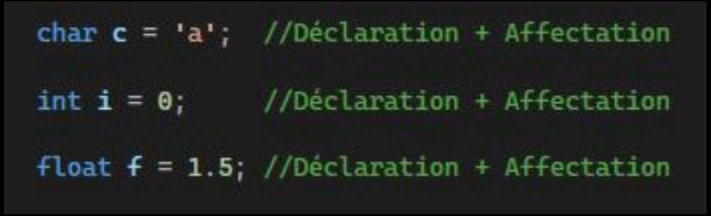


```
//Caractère
char c;                   //1  octet   (8 bits)
unsigned char uc;         //1  octet   (8 bits)

//Entier
short int si;             //2  octets  (16 bits)
unsigned short int usi;   //2  octets  (16 bits)
int i;                    //4  octets  (32 bits)
unsigned int ui;          //4  octets  (32 bits)
long l;                   //8  octets  (64 bits)
unsigned long ul;         //8  octets  (64 bits)

//Nombre à virgule
float f;                  //4  octets  (32 bits)
double d;                 //8  octets  (64 bits)
long double ld;           //16 octets  (128 bits)
```

Les types :
Déclaration et affectation

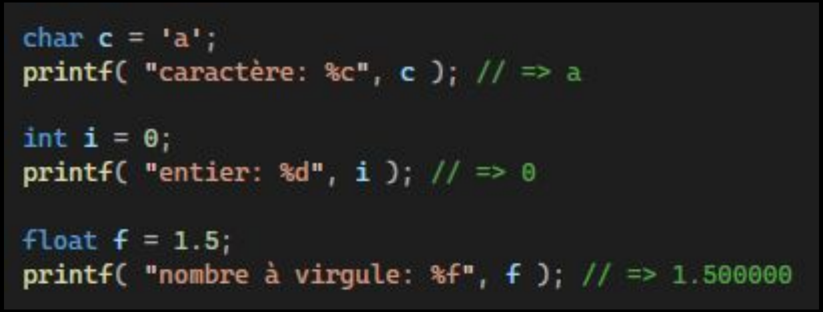


```c
char c;   //Déclaration
c = 'a'; //Affectation

int i;    //Déclaration
i = 5;    //Affectation

float f; //Déclaration
f = 1.5; //Affectation
```



```c
char c = 'a';   //Déclaration + Affectation

int i = 0;      //Déclaration + Affectation

float f = 1.5; //Déclaration + Affectation
```

Les types : Affichage



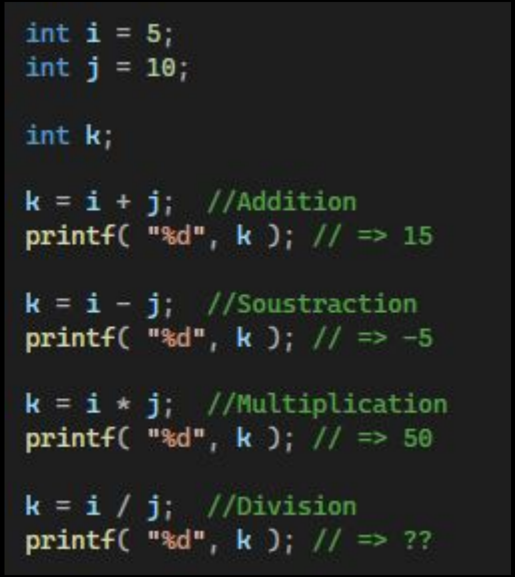
```
char c = 'a';
printf( "caractère: %c", c ); // => a

int i = 0;
printf( "entier: %d", i ); // => 0

float f = 1.5;
printf( "nombre à virgule: %f", f ); // => 1.500000
```

char : %c

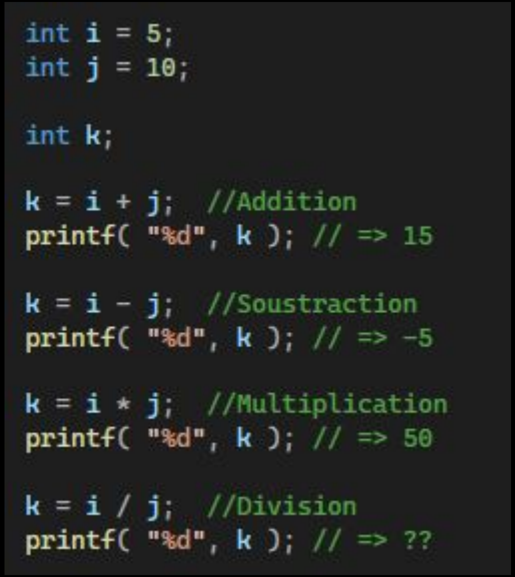
int : %d

float : %f

Les types :
Opérations sur int


```c
int i = 5;
int j = 10;

int k;

k = i + j;  //Addition
printf( "%d", k ); // => 15

k = i - j;  //Soustraction
printf( "%d", k ); // => -5

k = i * j;  //Multiplication
printf( "%d", k ); // => 50

k = i / j;  //Division
printf( "%d", k ); // => ??
```

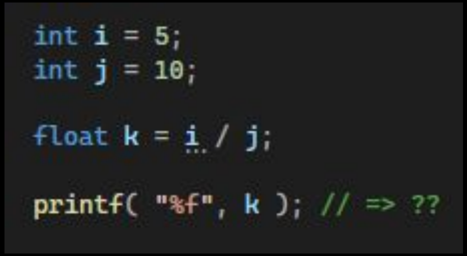
Les types :
Opérations sur int



```c
int i = 5;
int j = 10;

int k;

k = i + j;  //Addition
printf( "%d", k ); // => 15

k = i - j;  //Soustraction
printf( "%d", k ); // => -5

k = i * j;  //Multiplication
printf( "%d", k ); // => 50

k = i / j;  //Division
printf( "%d", k ); // => ??
```

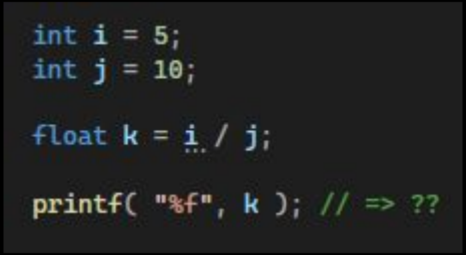
=> 0

Les types :
Opération sur float



```
int i = 5;
int j = 10;

float k = i / j;

printf( "%f", k ); // => ??
```

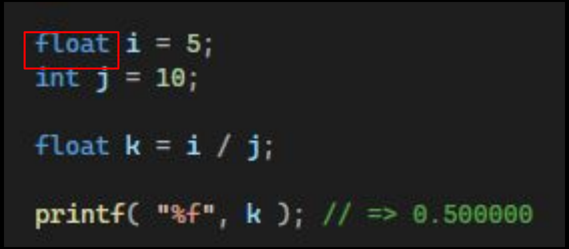
Les types :
Opération sur float



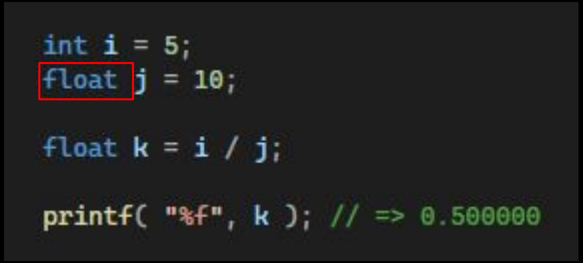
```
int i = 5;
int j = 10;

float k = i / j;

printf( "%f", k ); // => ??
```

=> 0.000000

Les types :
Opération sur float

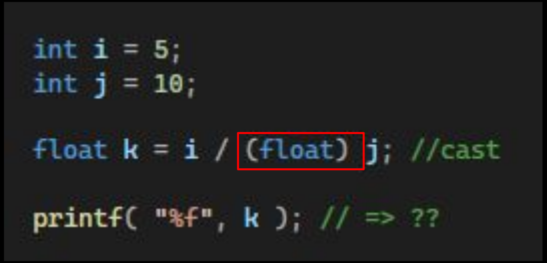


```c
float i = 5;
int j = 10;

float k = i / j;

printf( "%f", k ); // => 0.500000
```

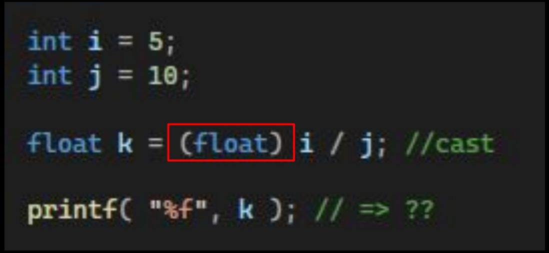


```c
int i = 5;
float j = 10;

float k = i / j;

printf( "%f", k ); // => 0.500000
```

Les types :
Opération sur float

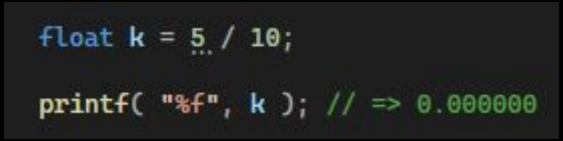


```c
int i = 5;
int j = 10;

float k = i / (float) j; //cast

printf( "%f", k ); // => ??
```

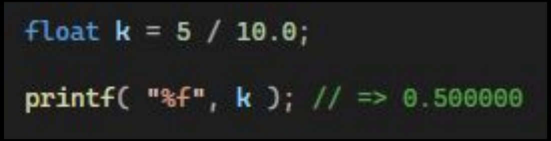


```c
int i = 5;
int j = 10;

float k = (float) i / j; //cast

printf( "%f", k ); // => ??
```

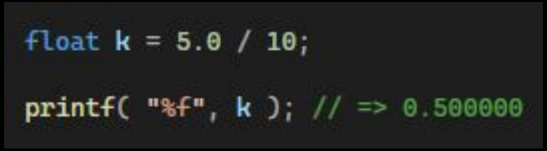
Les types :
Opération sur float



```c
float k = 5 / 10;

printf( "%f", k ); // => 0.000000
```

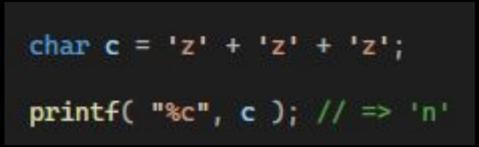


```c
float k = 5 / 10.0;

printf( "%f", k ); // => 0.500000
```



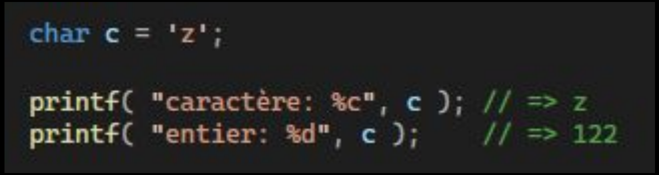
```c
float k = 5.0 / 10;

printf( "%f", k ); // => 0.500000
```

Les types : Opération sur char



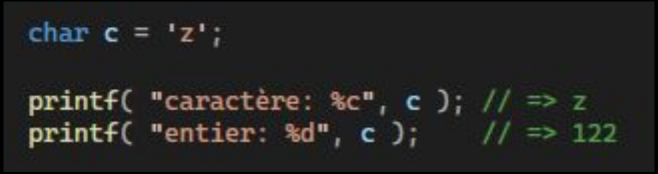
```c
char c = 'z' + 'z' + 'z';

printf( "%c", c ); // => 'n'
```

Les types :
Qu’est ce qu’un char ?

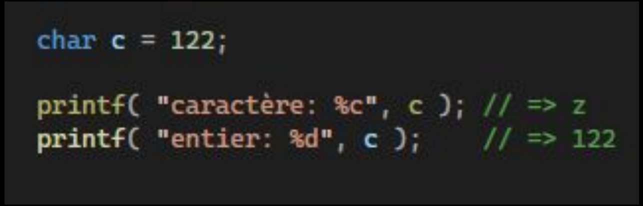


```
char c = 'z';

printf( "caractère: %c", c ); // => z
printf( "entier: %d", c );    // => 122
```

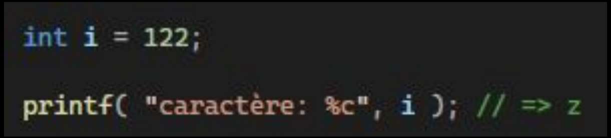
Les types :
Qu’est ce qu’un char ?



```c
char c = 'z';

printf( "caractère: %c", c ); // => z
printf( "entier: %d", c );    // => 122
```

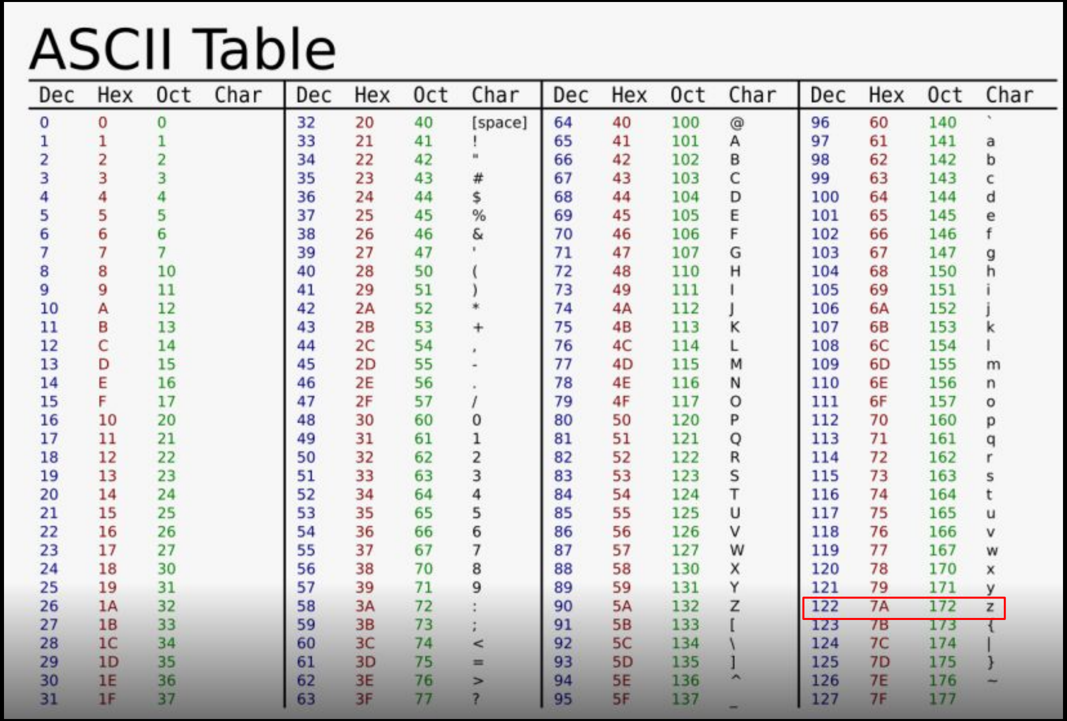


```c
char c = 122;

printf( "caractère: %c", c ); // => z
printf( "entier: %d", c );    // => 122
```



```c
int i = 122;

printf( "caractère: %c", i ); // => z
```

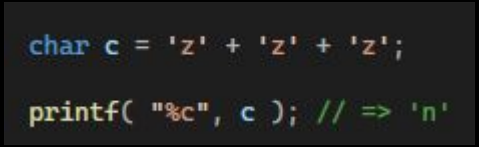
Les types:
Table ASCII



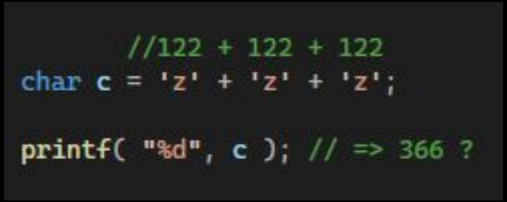
ASCII Table

Dec	Hex	Oct	Char	Dec	Hex	Oct	Char	Dec	Hex	Oct	Char	Dec	Hex	Oct	Char
0	0	0		32	20	40	[space]	64	40	100	@	96	60	140	`
1	1	1		33	21	41	!	65	41	101	A	97	61	141	a
2	2	2		34	22	42	"	66	42	102	B	98	62	142	b
3	3	3		35	23	43	#	67	43	103	C	99	63	143	c
4	4	4		36	24	44	$	68	44	104	D	100	64	144	d
5	5	5		37	25	45	%	69	45	105	E	101	65	145	e
6	6	6		38	26	46	&	70	46	106	F	102	66	146	f
7	7	7		39	27	47	'	71	47	107	G	103	67	147	g
8	8	10		40	28	50	(	72	48	110	H	104	68	150	h
9	9	11		41	29	51	)	73	49	111	I	105	69	151	i
10	A	12		42	2A	52	*	74	4A	112	J	106	6A	152	j
11	B	13		43	2B	53	+	75	4B	113	K	107	6B	153	k
12	C	14		44	2C	54	,	76	4C	114	L	108	6C	154	l
13	D	15		45	2D	55	-	77	4D	115	M	109	6D	155	m
14	E	16		46	2E	56	.	78	4E	116	N	110	6E	156	n
15	F	17		47	2F	57	/	79	4F	117	O	111	6F	157	o
16	10	20		48	30	60	0	80	50	120	P	112	70	160	p
17	11	21		49	31	61	1	81	51	121	Q	113	71	161	q
18	12	22		50	32	62	2	82	52	122	R	114	72	162	r
19	13	23		51	33	63	3	83	53	123	S	115	73	163	s
20	14	24		52	34	64	4	84	54	124	T	116	74	164	t
21	15	25		53	35	65	5	85	55	125	U	117	75	165	u
22	16	26		54	36	66	6	86	56	126	V	118	76	166	v
23	17	27		55	37	67	7	87	57	127	W	119	77	167	w
24	18	30		56	38	70	8	88	58	130	X	120	78	170	x
25	19	31		57	39	71	9	89	59	131	Y	121	79	171	y
26	1A	32		58	3A	72	:	90	5A	132	Z	122	7A	172	z
27	1B	33		59	3B	73	;	91	5B	133	[	123	7B	173	{
28	1C	34		60	3C	74	<	92	5C	134	\	124	7C	174	|
29	1D	35		61	3D	75	=	93	5D	135	]	125	7D	175	}
30	1E	36		62	3E	76	>	94	5E	136	^	126	7E	176	~
31	1F	37		63	3F	77	?	95	5F	137	_	127	7F	177	

Les types : Overflow

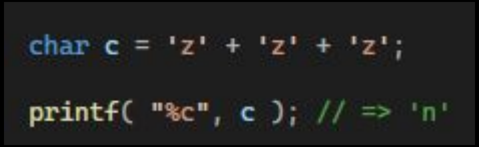


```c
char c = 'z' + 'z' + 'z';

printf( "%c", c ); // => 'n'
```

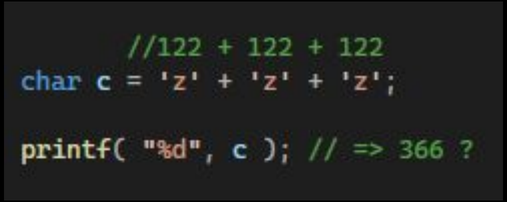


```c
        //122 + 122 + 122
char c = 'z' + 'z' + 'z';

printf( "%d", c ); // => 366 ?
```

Les types : Overflow



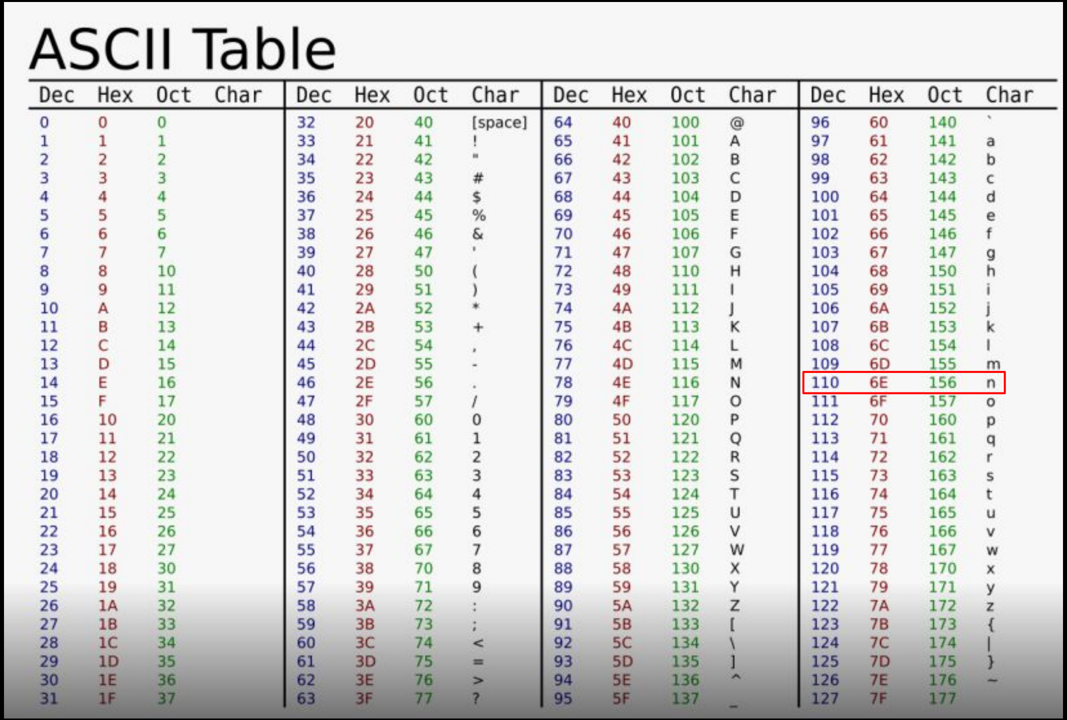
```c
char c = 'z' + 'z' + 'z';

printf( "%c", c ); // => 'n'
```



```c
        //122 + 122 + 122
char c = 'z' + 'z' + 'z';

printf( "%d", c ); // => 366 ?
```

=> 110

Les types : Overflow



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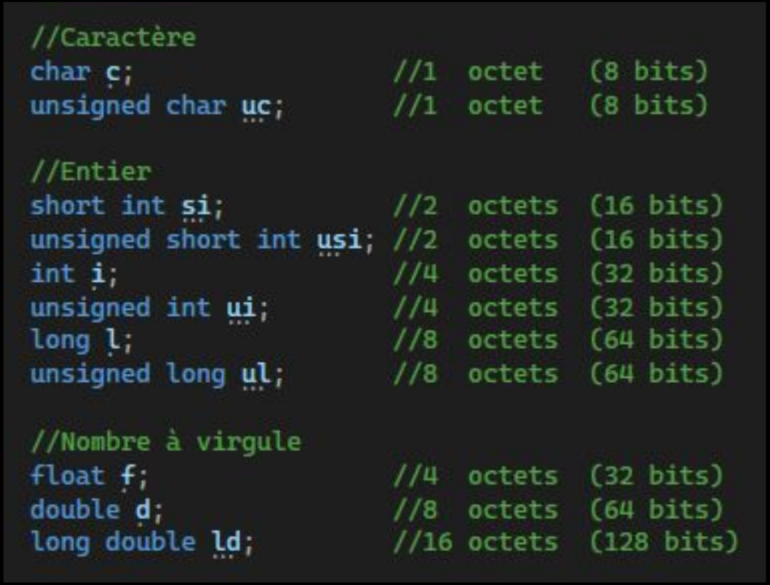
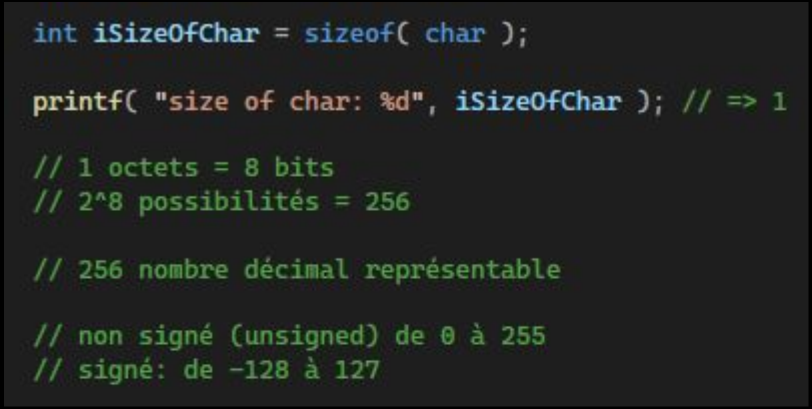
Dec	Hex	Oct	Char	Dec	Hex	Oct	Char	Dec	Hex	Oct	Char	Dec	Hex	Oct	Char
0	0	0		32	20	40	[space]	64	40	100	@	96	60	140	`
1	1	1		33	21	41	!	65	41	101	A	97	61	141	a
2	2	2		34	22	42	"	66	42	102	B	98	62	142	b
3	3	3		35	23	43	#	67	43	103	C	99	63	143	c
4	4	4		36	24	44	$	68	44	104	D	100	64	144	d
5	5	5		37	25	45	%	69	45	105	E	101	65	145	e
6	6	6		38	26	46	&	70	46	106	F	102	66	146	f
7	7	7		39	27	47	'	71	47	107	G	103	67	147	g
8	8	10		40	28	50	(	72	48	110	H	104	68	150	h
9	9	11		41	29	51	)	73	49	111	I	105	69	151	i
10	A	12		42	2A	52	*	74	4A	112	J	106	6A	152	j
11	B	13		43	2B	53	+	75	4B	113	K	107	6B	153	k
12	C	14		44	2C	54	,	76	4C	114	L	108	6C	154	l
13	D	15		45	2D	55	-	77	4D	115	M	109	6D	155	m
14	E	16		46	2E	56	.	78	4E	116	N	110	6E	156	n
15	F	17		47	2F	57	/	79	4F	117	O	111	6F	157	o
16	10	20		48	30	60	0	80	50	120	P	112	70	160	p
17	11	21		49	31	61	1	81	51	121	Q	113	71	161	q
18	12	22		50	32	62	2	82	52	122	R	114	72	162	r
19	13	23		51	33	63	3	83	53	123	S	115	73	163	s
20	14	24		52	34	64	4	84	54	124	T	116	74	164	t
21	15	25		53	35	65	5	85	55	125	U	117	75	165	u
22	16	26		54	36	66	6	86	56	126	V	118	76	166	v
23	17	27		55	37	67	7	87	57	127	W	119	77	167	w
24	18	30		56	38	70	8	88	58	130	X	120	78	170	x
25	19	31		57	39	71	9	89	59	131	Y	121	79	171	y
26	1A	32		58	3A	72	:	90	5A	132	Z	122	7A	172	z
27	1B	33		59	3B	73	;	91	5B	133	[	123	7B	173	{
28	1C	34		60	3C	74	<	92	5C	134	\	124	7C	174	|
29	1D	35		61	3D	75	=	93	5D	135	]	125	7D	175	}
30	1E	36		62	3E	76	>	94	5E	136	^	126	7E	176	~
31	1F	37		63	3F	77	?	95	5F	137	_	127	7F	177	

Les types : Overflow

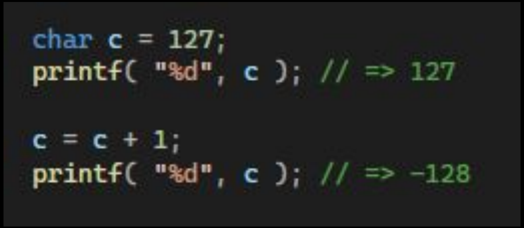


```c
//Caractère
char c;                  //1  octet   (8 bits)
unsigned char uc;        //1  octet   (8 bits)

//Entier
short int si;            //2  octets  (16 bits)
unsigned short int usi;  //2  octets  (16 bits)
int i;                   //4  octets  (32 bits)
unsigned int ui;         //4  octets  (32 bits)
long l;                  //8  octets  (64 bits)
unsigned long ul;        //8  octets  (64 bits)

//Nombre à virgule
float f;                 //4  octets  (32 bits)
double d;                //8  octets  (64 bits)
long double ld;          //16 octets  (128 bits)
```



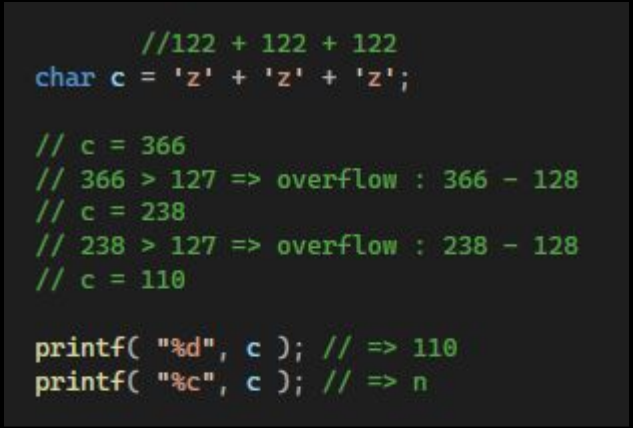
```c
int iSizeOfChar = sizeof( char );

printf( "size of char: %d", iSizeOfChar ); // => 1

// 1 octets = 8 bits
// 2^8 possibilités = 256

// 256 nombre décimal représentable

// non signé (unsigned) de 0 à 255
// signé: de -128 à 127
```

Les types : Overflow



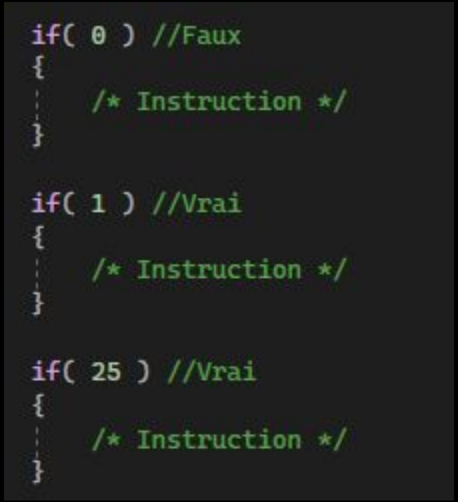
```
char c = 127;
printf( "%d", c ); // => 127

c = c + 1;
printf( "%d", c ); // => -128
```

Les types : Overflow



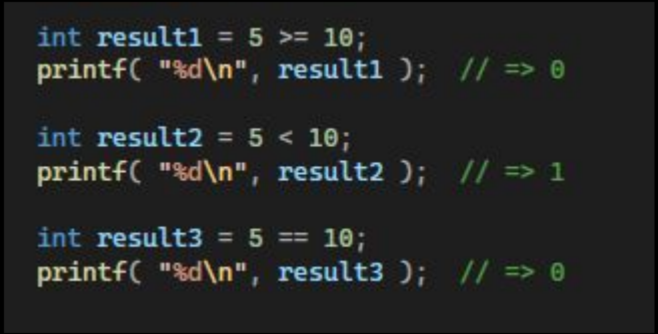
```
       //122 + 122 + 122
char c = 'z' + 'z' + 'z';

// c = 366
// 366 > 127 => overflow : 366 - 128
// c = 238
// 238 > 127 => overflow : 238 - 128
// c = 110

printf( "%d", c ); // => 110
printf( "%c", c ); // => n
```

Les conditions



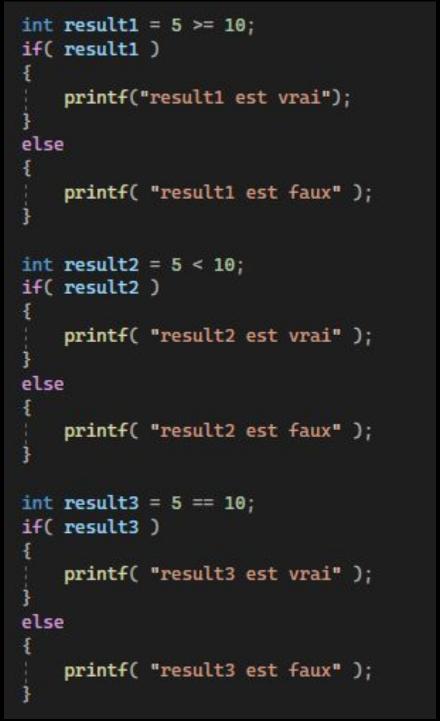
```
if( 0 ) //Faux
{
    /* Instruction */
}

if( 1 ) //Vrai
{
    /* Instruction */
}

if( 25 ) //Vrai
{
    /* Instruction */
}
```

Les conditions



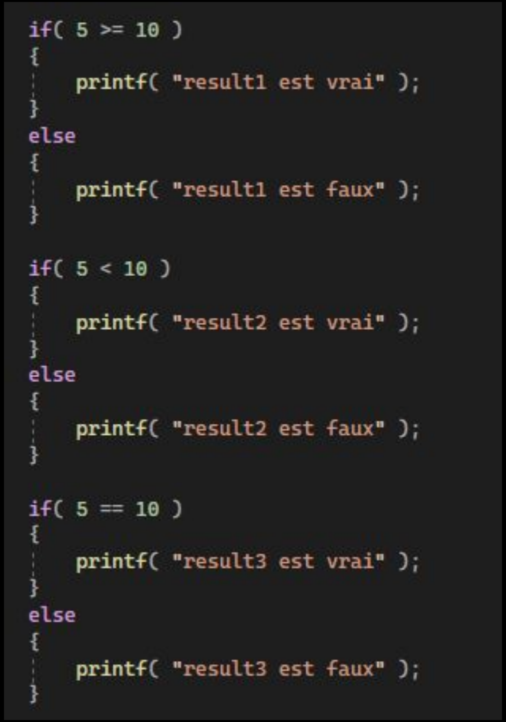
```
int result1 = 5 >= 10;
printf( "%d\n", result1 );  // => 0

int result2 = 5 < 10;
printf( "%d\n", result2 );  // => 1

int result3 = 5 == 10;
printf( "%d\n", result3 );  // => 0
```

Les conditions



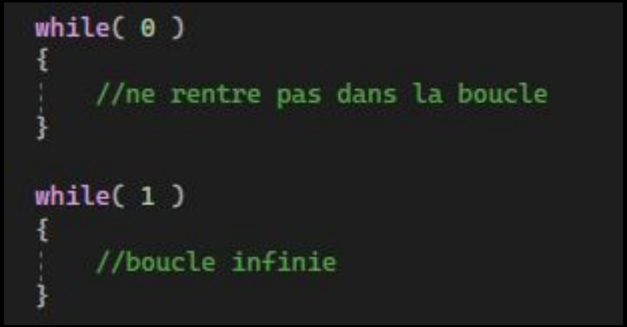
```c
int result1 = 5 >= 10;
if( result1 )
{
    printf("result1 est vrai");
}
else
{
    printf( "result1 est faux" );
}

int result2 = 5 < 10;
if( result2 )
{
    printf( "result2 est vrai" );
}
else
{
    printf( "result2 est faux" );
}

int result3 = 5 == 10;
if( result3 )
{
    printf( "result3 est vrai" );
}
else
{
    printf( "result3 est faux" );
}
```

Les conditions



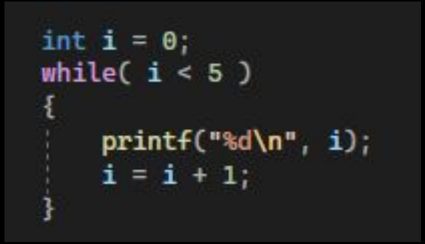
```c
if( 5 >= 10 )
{
    printf( "result1 est vrai" );
}
else
{
    printf( "result1 est faux" );
}

if( 5 < 10 )
{
    printf( "result2 est vrai" );
}
else
{
    printf( "result2 est faux" );
}

if( 5 == 10 )
{
    printf( "result3 est vrai" );
}
else
{
    printf( "result3 est faux" );
}
```

Les boucles

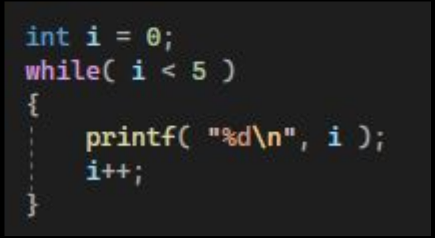


```
while( 0 )
{
    //ne rentre pas dans la boucle
}

while( 1 )
{
    //boucle infinie
}
```

Les boucles

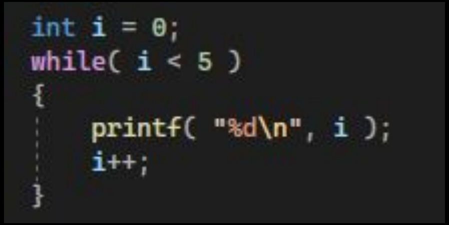


```c
int i = 0;
while( i < 5 )
{
    printf("%d\n", i);
    i = i + 1;
}
```

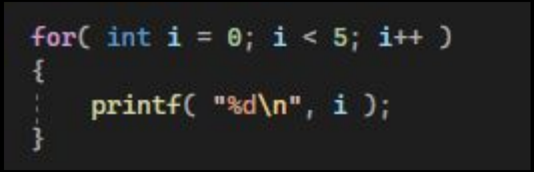


```c
int i = 0;
while( i < 5 )
{
    printf( "%d\n", i );
    i++;
}
```

Les boucles

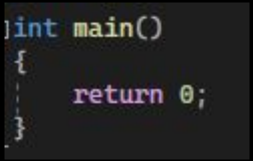


```c
int i = 0;
while( i < 5 )
{
    printf( "%d\n", i );
    i++;
}
```



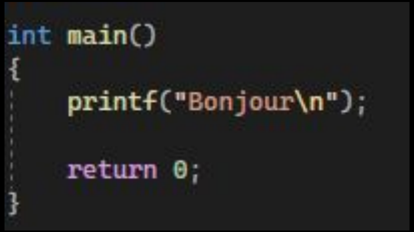
```c
for( int i = 0; i < 5; i++ )
{
    printf( "%d\n", i );
}
```

Les fonctions : main



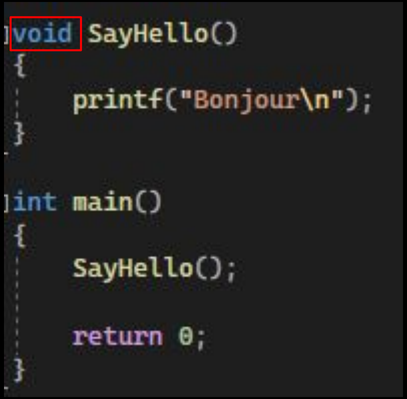
```
int main()
{
    return 0;
}
```

Les fonctions : main



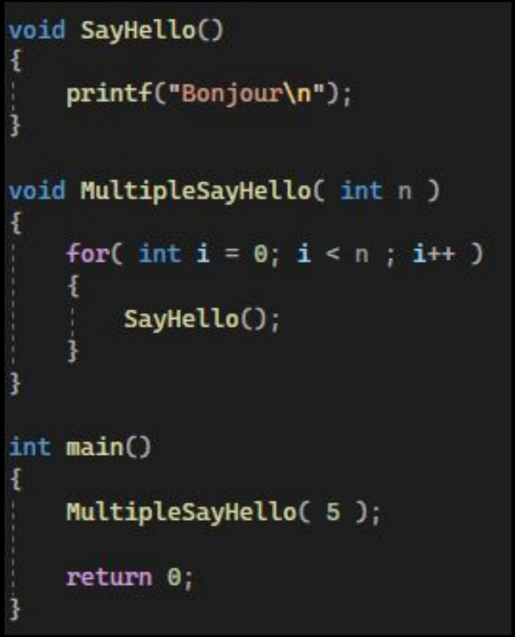
```c
int main()
{
    printf("Bonjour\n");

    return 0;
}
```

Les fonctions :
Sans retour



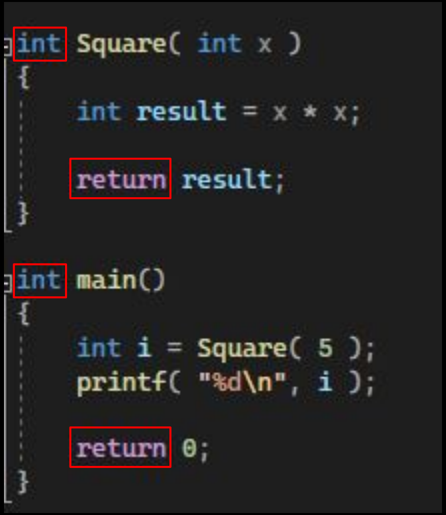
```c
void SayHello()
{
    printf("Bonjour\n");
}

int main()
{
    SayHello();

    return 0;
}
```

Les fonctions : Sans retour



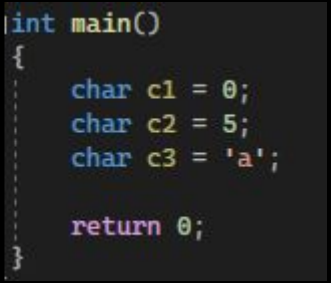
```c
void SayHello()
{
    printf("Bonjour\n");
}

void MultipleSayHello( int n )
{
    for( int i = 0; i < n ; i++ )
    {
        SayHello();
    }
}

int main()
{
    MultipleSayHello( 5 );

    return 0;
}
```

Les fonctions : Avec retour

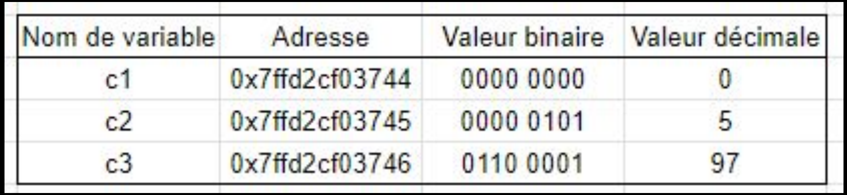


```
int Square( int x )
{
    int result = x * x;

    return result;
}

int main()
{
    int i = Square( 5 );
    printf( "%d\n", i );

    return 0;
}
```

Les adresses

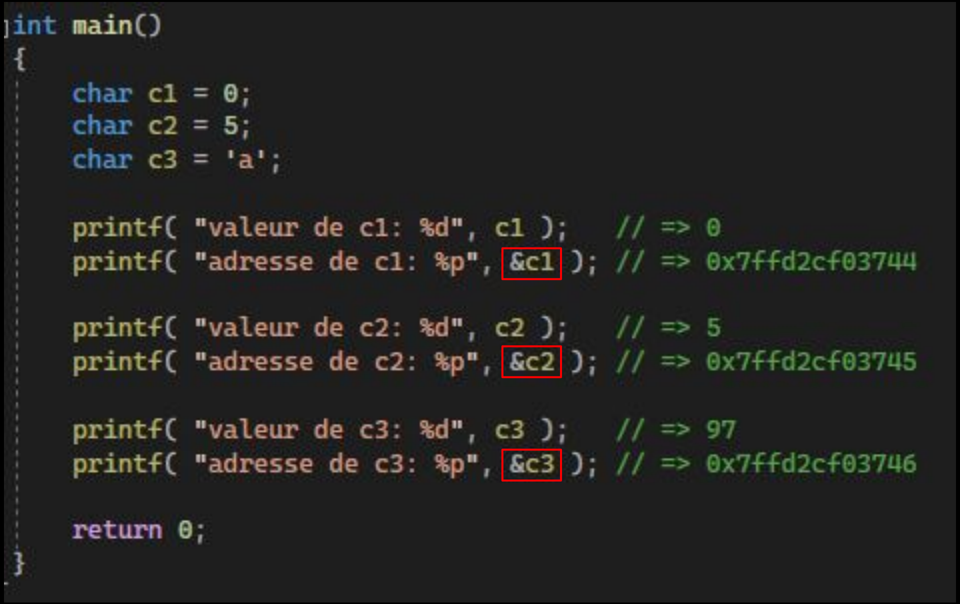


```
int main()
{
    char c1 = 0;
    char c2 = 5;
    char c3 = 'a';

    return 0;
}
```

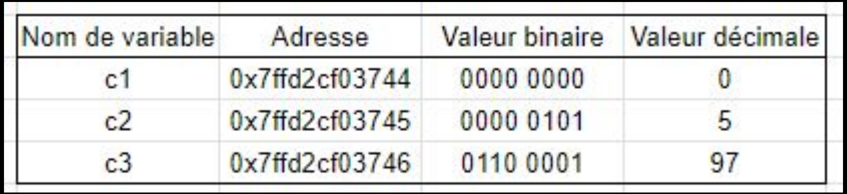


Nom de variable	Adresse	Valeur binaire	Valeur décimale
c1	0x7ffd2cf03744	0000 0000	0
c2	0x7ffd2cf03745	0000 0101	5
c3	0x7ffd2cf03746	0110 0001	97

Les adresses :
&

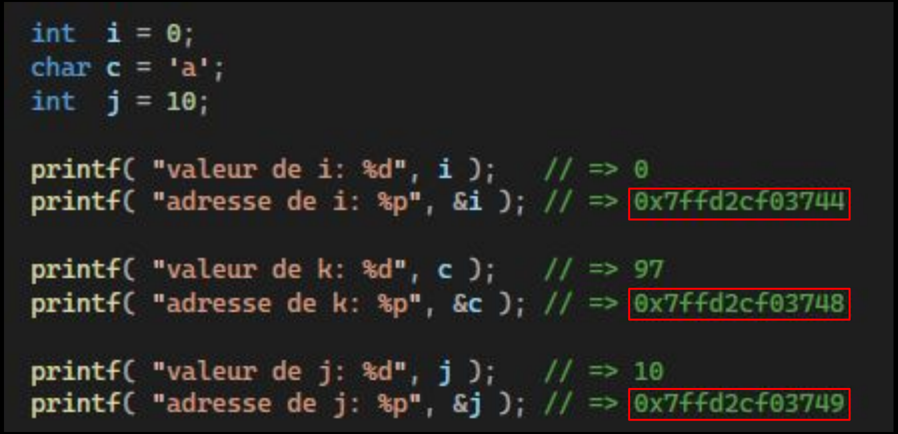


```c
int main()
{
    char c1 = 0;
    char c2 = 5;
    char c3 = 'a';

    printf( "valeur de c1: %d", c1 );   // => 0
    printf( "adresse de c1: %p", &c1 ); // => 0x7ffd2cf03744

    printf( "valeur de c2: %d", c2 );   // => 5
    printf( "adresse de c2: %p", &c2 ); // => 0x7ffd2cf03745

    printf( "valeur de c3: %d", c3 );   // => 97
    printf( "adresse de c3: %p", &c3 ); // => 0x7ffd2cf03746

    return 0;
}
```

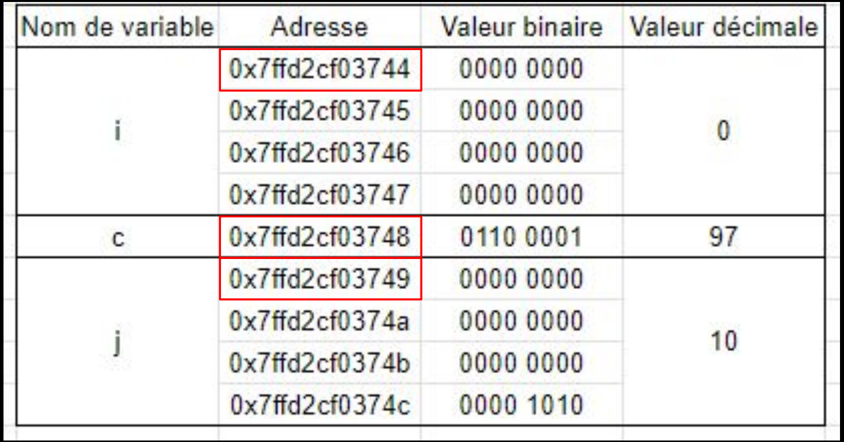


Nom de variable	Adresse	Valeur binaire	Valeur décimale
c1	0x7ffd2cf03744	0000 0000	0
c2	0x7ffd2cf03745	0000 0101	5
c3	0x7ffd2cf03746	0110 0001	97

Les adresses

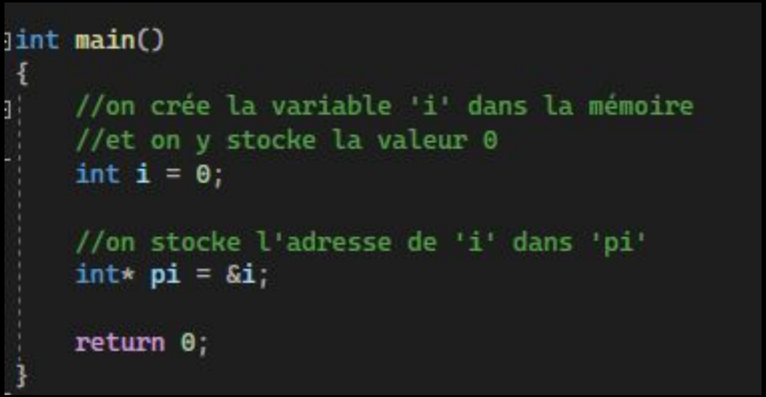


```
int  i = 0;
char c = 'a';
int  j = 10;

printf( "valeur de i: %d", i );   // => 0
printf( "adresse de i: %p", &i ); // => 0x7ffd2cf03744

printf( "valeur de k: %d", c );   // => 97
printf( "adresse de k: %p", &c ); // => 0x7ffd2cf03748

printf( "valeur de j: %d", j );   // => 10
printf( "adresse de j: %p", &j ); // => 0x7ffd2cf03749
```

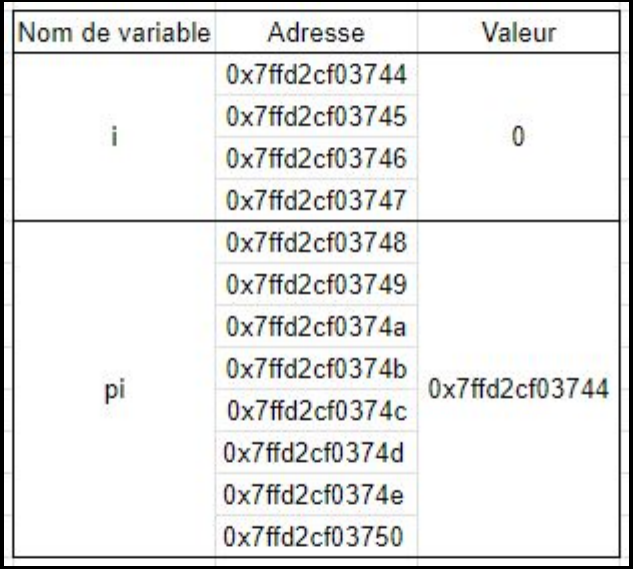


Nom de variable	Adresse	Valeur binaire	Valeur décimale
i	0x7ffd2cf03744	0000 0000	0
	0x7ffd2cf03745	0000 0000	
	0x7ffd2cf03746	0000 0000	
	0x7ffd2cf03747	0000 0000	
c	0x7ffd2cf03748	0110 0001	97
j	0x7ffd2cf03749	0000 0000	10
	0x7ffd2cf0374a	0000 0000	
	0x7ffd2cf0374b	0000 0000	
	0x7ffd2cf0374c	0000 1010	

Les pointeurs

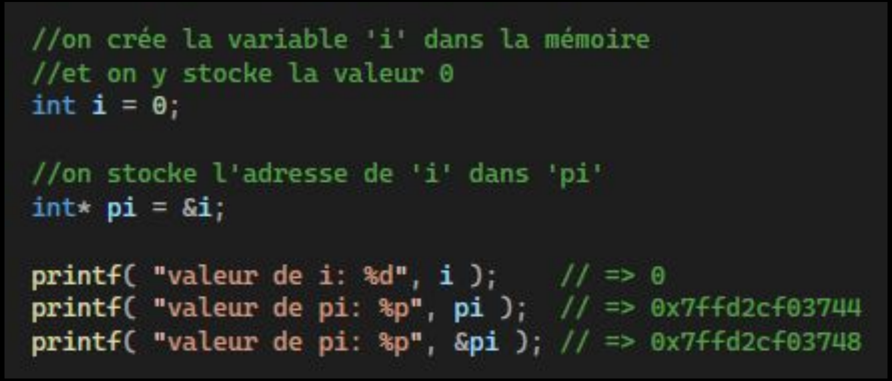


```c
int main()
{
    //on crée la variable 'i' dans la mémoire
    //et on y stocke la valeur 0
    int i = 0;

    //on stocke l'adresse de 'i' dans 'pi'
    int* pi = &i;

    return 0;
}
```

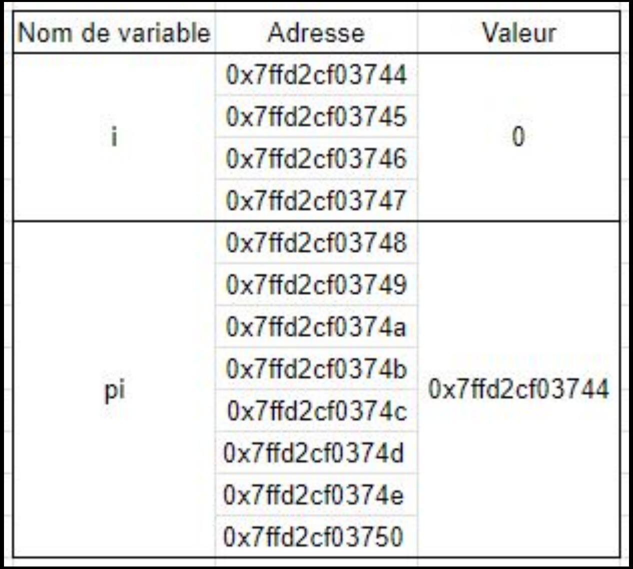


Nom de variable	Adresse	Valeur
i	0x7ffd2cf03744	0
	0x7ffd2cf03745	
	0x7ffd2cf03746	
	0x7ffd2cf03747	
pi	0x7ffd2cf03748	0x7ffd2cf03744
	0x7ffd2cf03749	
	0x7ffd2cf0374a	
	0x7ffd2cf0374b	
	0x7ffd2cf0374c	
	0x7ffd2cf0374d	
	0x7ffd2cf0374e	
	0x7ffd2cf03750	

Les pointeurs

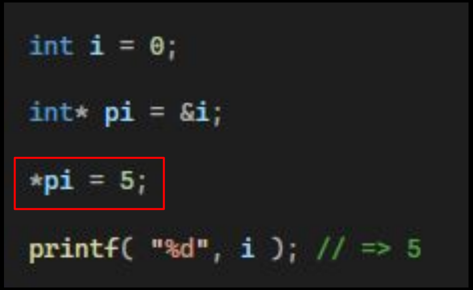


```c
//on crée la variable 'i' dans la mémoire
//et on y stocke la valeur 0
int i = 0;

//on stocke l'adresse de 'i' dans 'pi'
int* pi = &i;

printf( "valeur de i: %d", i );    // => 0
printf( "valeur de pi: %p", pi );  // => 0x7ffd2cf03744
printf( "valeur de pi: %p", &pi ); // => 0x7ffd2cf03748
```



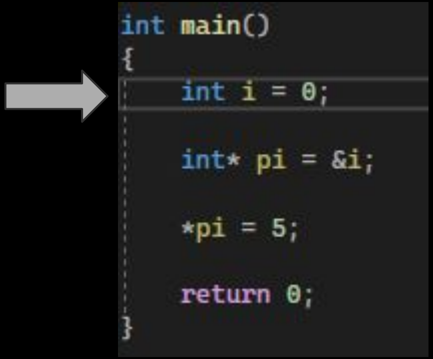
Nom de variable	Adresse	Valeur
i	0x7ffd2cf03744	0
	0x7ffd2cf03745	
	0x7ffd2cf03746	
	0x7ffd2cf03747	
pi	0x7ffd2cf03748	0x7ffd2cf03744
	0x7ffd2cf03749	
	0x7ffd2cf0374a	
	0x7ffd2cf0374b	
	0x7ffd2cf0374c	
	0x7ffd2cf0374d	
	0x7ffd2cf0374e	
	0x7ffd2cf03750	

Les pointeurs : déréférencement

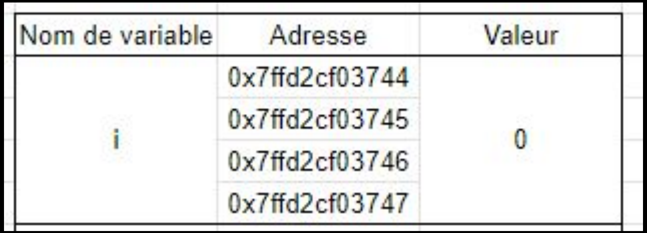


```c
int i = 0;

int* pi = &i;

*pi = 5;

printf( "%d", i ); // => 5
```

Les pointeurs : déréférencement

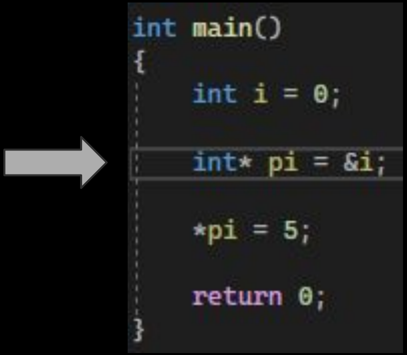


```
int main()
{
    int i = 0;

    int* pi = &i;

    *pi = 5;

    return 0;
}
```

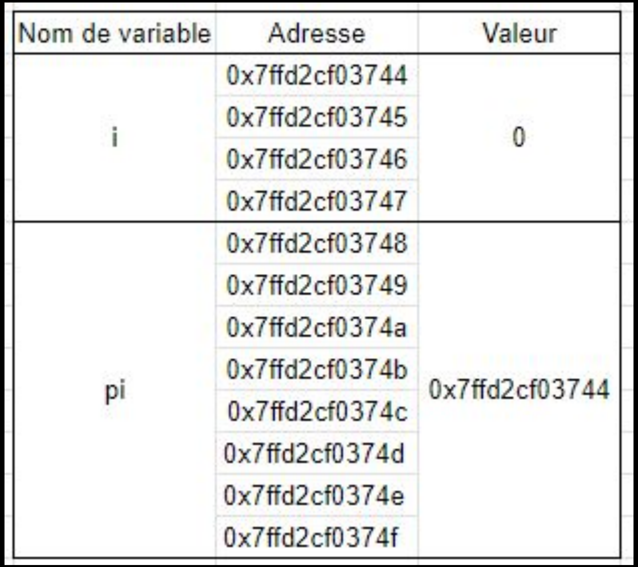


Nom de variable	Adresse	Valeur
i	0x7ffd2cf03744	0
	0x7ffd2cf03745	
	0x7ffd2cf03746	
	0x7ffd2cf03747	

Les pointeurs : déréférencement

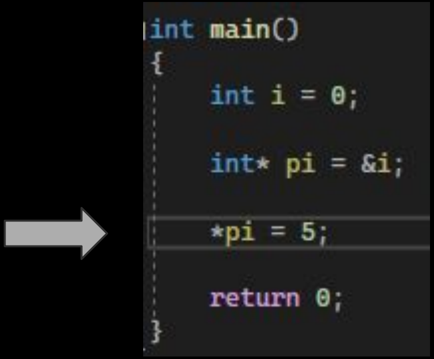


```
int main()
{
    int i = 0;

    int* pi = &i;

    *pi = 5;

    return 0;
}
```

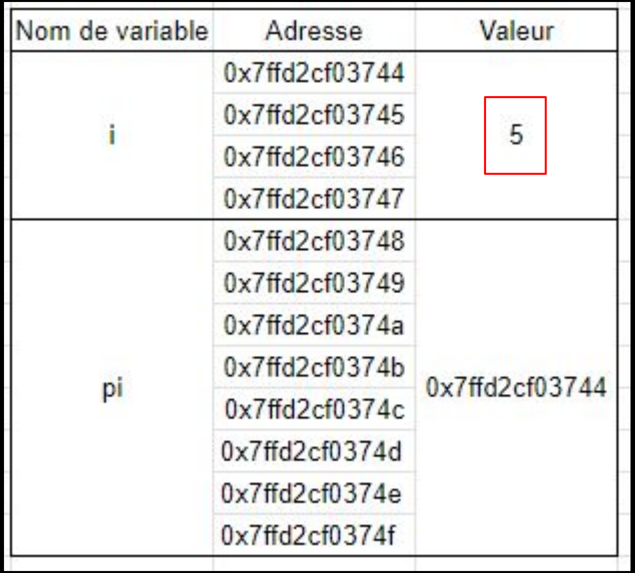


Nom de variable	Adresse	Valeur
i	0x7ffd2cf03744	0
	0x7ffd2cf03745	
	0x7ffd2cf03746	
	0x7ffd2cf03747	
pi	0x7ffd2cf03748	0x7ffd2cf03744
	0x7ffd2cf03749	
	0x7ffd2cf0374a	
	0x7ffd2cf0374b	
	0x7ffd2cf0374c	
	0x7ffd2cf0374d	
	0x7ffd2cf0374e	
	0x7ffd2cf0374f	

Les pointeurs : déréférencement

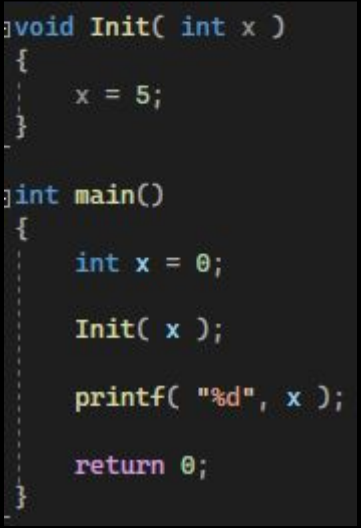


```
int main()
{
    int i = 0;

    int* pi = &i;

    *pi = 5;

    return 0;
}
```



Nom de variable	Adresse	Valeur
i	0x7ffd2cf03744	5
	0x7ffd2cf03745	
	0x7ffd2cf03746	
	0x7ffd2cf03747	
pi	0x7ffd2cf03748	0x7ffd2cf03744
	0x7ffd2cf03749	
	0x7ffd2cf0374a	
	0x7ffd2cf0374b	
	0x7ffd2cf0374c	
	0x7ffd2cf0374d	
	0x7ffd2cf0374e	
	0x7ffd2cf0374f	

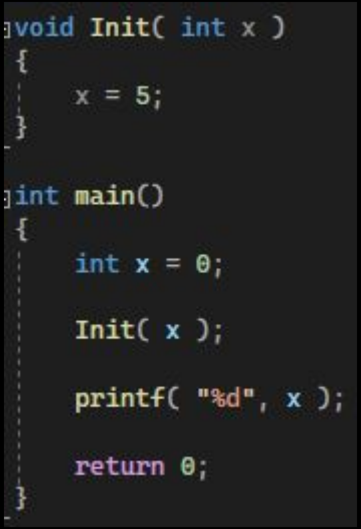
Les pointeurs



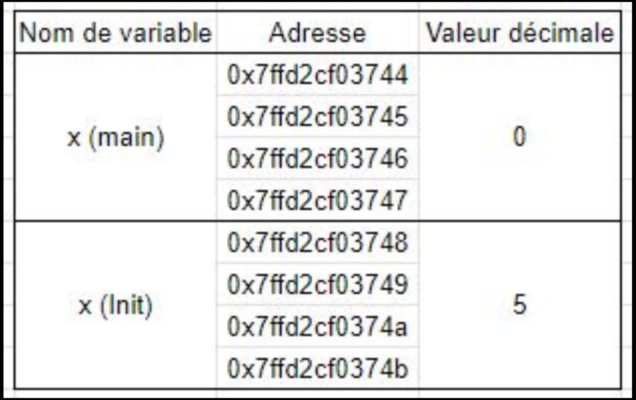
```c
void Init( int x )
{
    x = 5;
}

int main()
{
    int x = 0;

    Init( x );

    printf( "%d", x );

    return 0;
}
```

=> ??

Les pointeurs

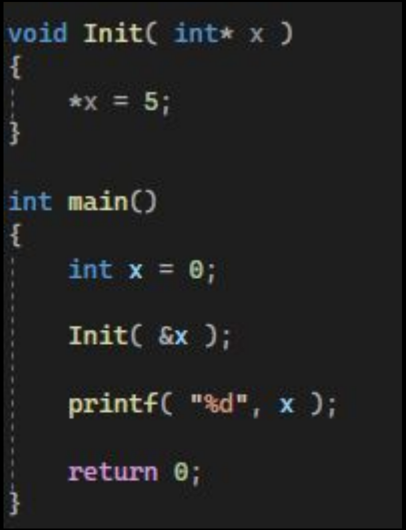


```c
void Init( int x )
{
    x = 5;
}

int main()
{
    int x = 0;

    Init( x );

    printf( "%d", x );

    return 0;
}
```

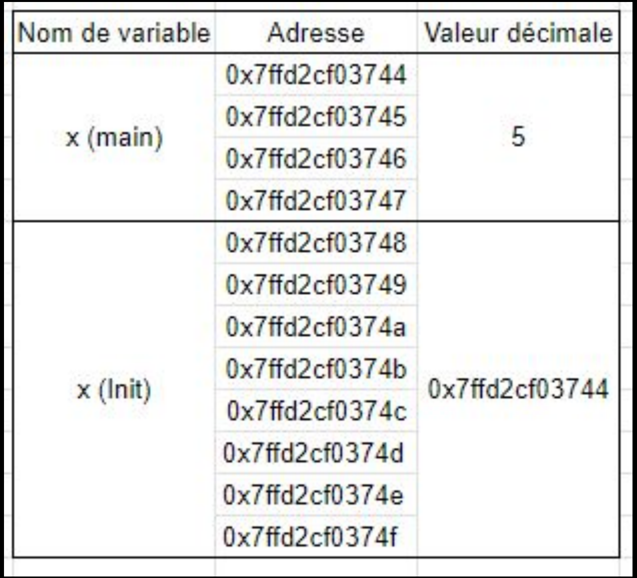


Nom de variable	Adresse	Valeur décimale
x (main)	0x7ffd2cf03744	0
	0x7ffd2cf03745	
	0x7ffd2cf03746	
	0x7ffd2cf03747	
x (Init)	0x7ffd2cf03748	5
	0x7ffd2cf03749	
	0x7ffd2cf0374a	
	0x7ffd2cf0374b	

Les pointeurs

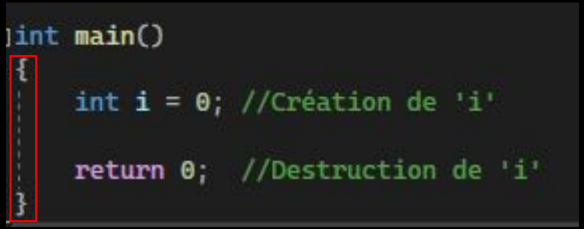


```
void Init( int* x )
{
    *x = 5;
}

int main()
{
    int x = 0;

    Init( &x );

    printf( "%d", x );

    return 0;
}
```



Nom de variable	Adresse	Valeur décimale
x (main)	0x7ffd2cf03744	5
	0x7ffd2cf03745	
	0x7ffd2cf03746	
	0x7ffd2cf03747	
x (Init)	0x7ffd2cf03748	0x7ffd2cf03744
	0x7ffd2cf03749	
	0x7ffd2cf0374a	
	0x7ffd2cf0374b	
	0x7ffd2cf0374c	
	0x7ffd2cf0374d	
	0x7ffd2cf0374e	
	0x7ffd2cf0374f	

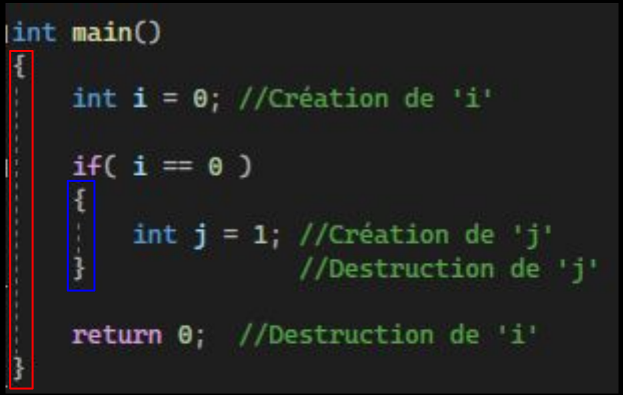
La pile :
Allocation de mémoire automatique



```
int main()
{
    int i = 0; //Création de 'i'

    return 0;  //Destruction de 'i'
}
```

La pile :
Allocation de mémoire automatique

scope du main
scope du if

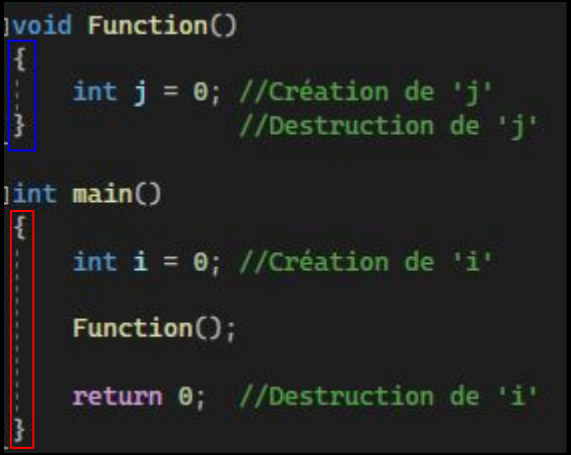


```
int main()
{
    int i = 0; //Création de 'i'

    if( i == 0 )
    {
        int j = 1; //Création de 'j'
    }              //Destruction de 'j'

    return 0;  //Destruction de 'i'
}
```

La pile :
Allocation de mémoire automatique

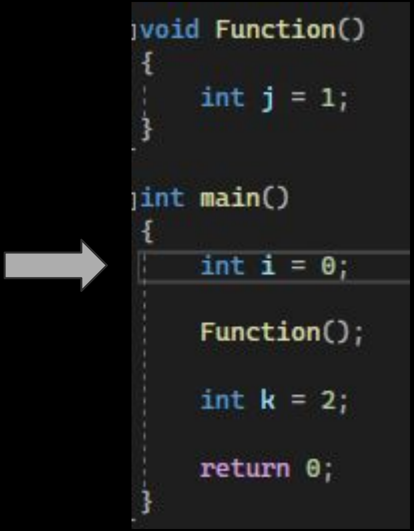
scope de Function

scope du main

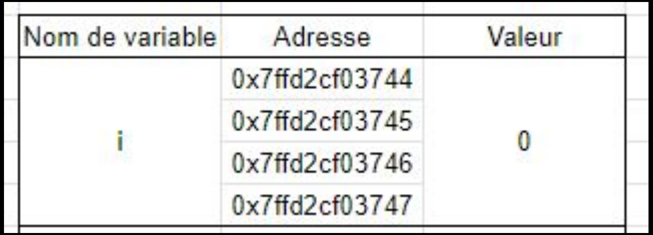


```
void Function()
{
    int j = 0; //Création de 'j'
}              //Destruction de 'j'

int main()
{
    int i = 0; //Création de 'i'

    Function();

    return 0;  //Destruction de 'i'
}
```

La pile :
Gestion de la mémoire

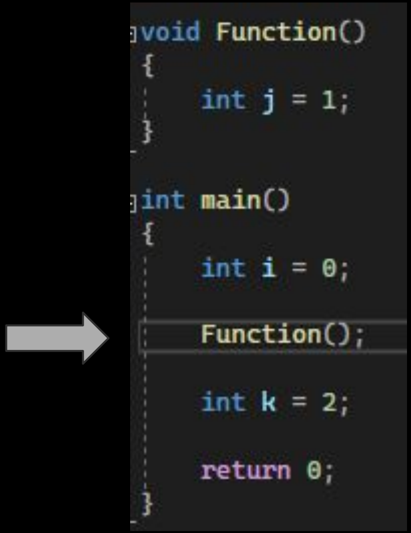


```c
void Function()
{
    int j = 1;
}

int main()
{
    int i = 0;

    Function();

    int k = 2;

    return 0;
}
```

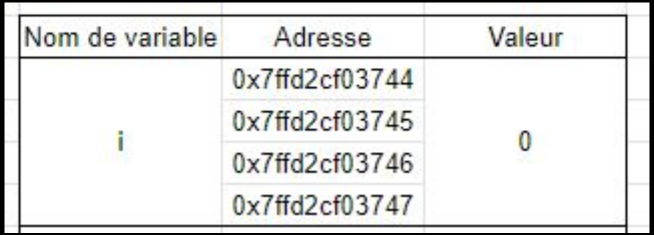


Nom de variable	Adresse	Valeur
i	0x7ffd2cf03744	0
	0x7ffd2cf03745	
	0x7ffd2cf03746	
	0x7ffd2cf03747	

La pile :
Gestion de la mémoire

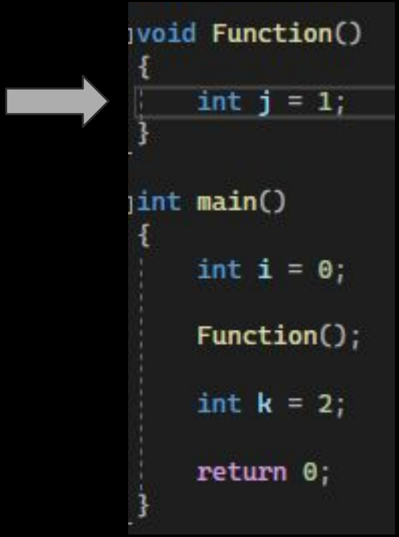


```
void Function()
{
    int j = 1;
}

int main()
{
    int i = 0;

    Function();

    int k = 2;

    return 0;
}
```

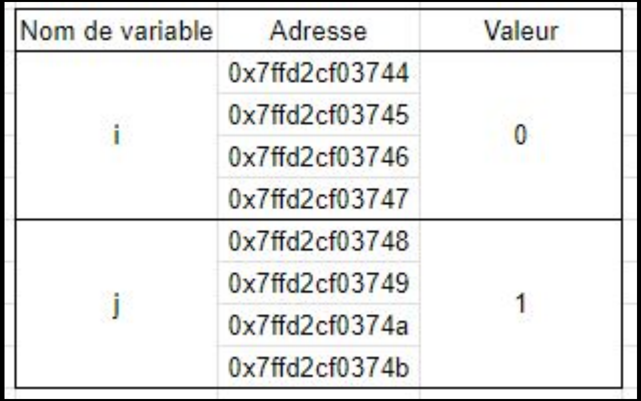


Nom de variable	Adresse	Valeur
i	0x7ffd2cf03744	0
	0x7ffd2cf03745	
	0x7ffd2cf03746	
	0x7ffd2cf03747	

La pile :
Gestion de la mémoire

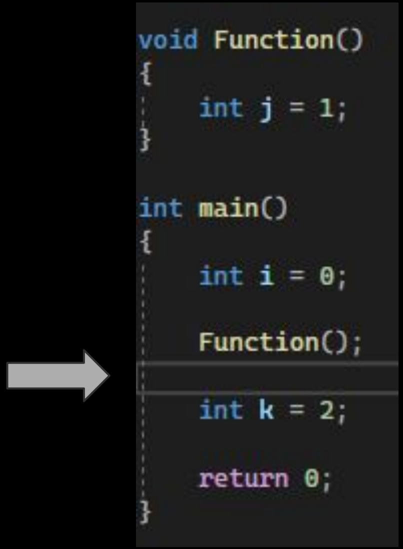


```c
void Function()
{
    int j = 1;
}

int main()
{
    int i = 0;

    Function();

    int k = 2;

    return 0;
}
```

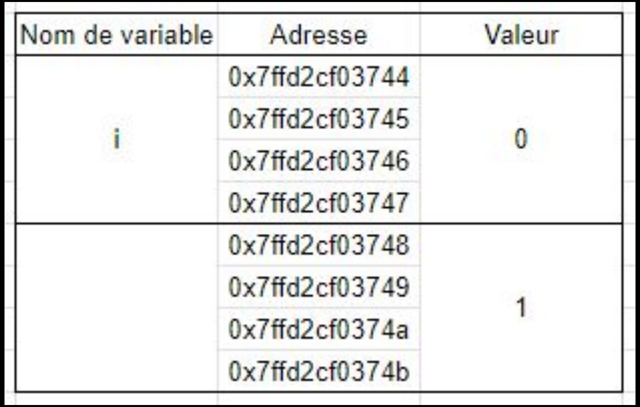


Nom de variable	Adresse	Valeur
i	0x7ffd2cf03744	0
	0x7ffd2cf03745	
	0x7ffd2cf03746	
	0x7ffd2cf03747	
j	0x7ffd2cf03748	1
	0x7ffd2cf03749	
	0x7ffd2cf0374a	
	0x7ffd2cf0374b	

La pile :
Gestion de la mémoire

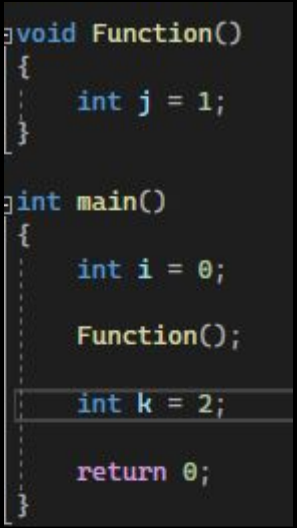


```c
void Function()
{
    int j = 1;
}

int main()
{
    int i = 0;

    Function();

    int k = 2;

    return 0;
}
```

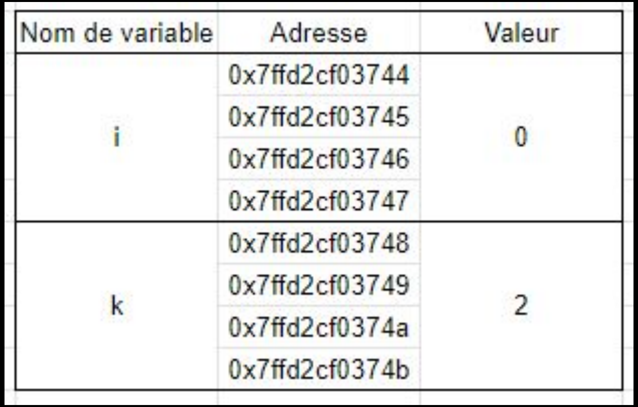


Nom de variable	Adresse	Valeur
i	0x7ffd2cf03744	0
	0x7ffd2cf03745	
	0x7ffd2cf03746	
	0x7ffd2cf03747	
	0x7ffd2cf03748	1
	0x7ffd2cf03749	
	0x7ffd2cf0374a	
	0x7ffd2cf0374b	

La pile :
Gestion de la mémoire

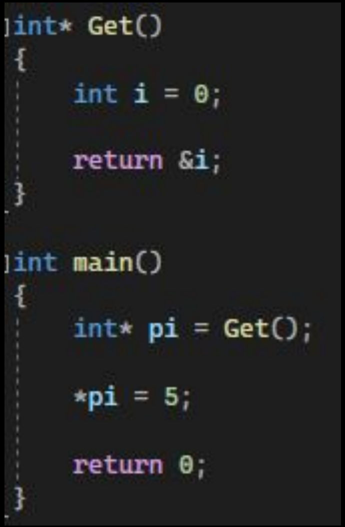


```
void Function()
{
    int j = 1;
}

int main()
{
    int i = 0;

    Function();

    int k = 2;

    return 0;
}
```



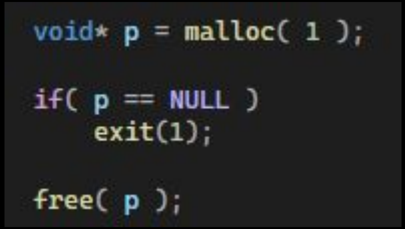
Nom de variable	Adresse	Valeur
i	0x7ffd2cf03744	0
	0x7ffd2cf03745	
	0x7ffd2cf03746	
	0x7ffd2cf03747	
k	0x7ffd2cf03748	2
	0x7ffd2cf03749	
	0x7ffd2cf0374a	
	0x7ffd2cf0374b	

La pile :
Gestion de la mémoire

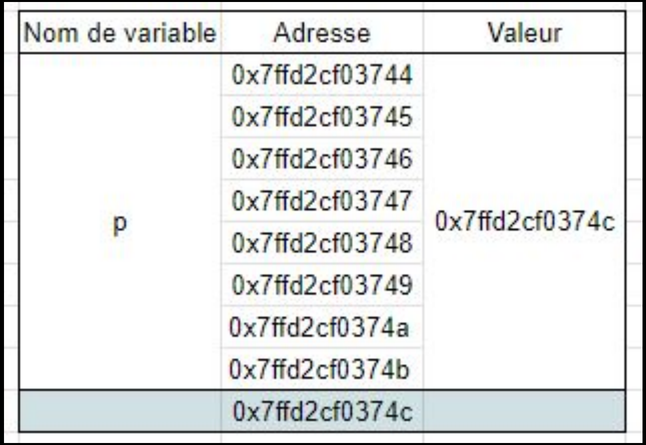


```
int* Get()
{
    int i = 0;

    return &i;
}

int main()
{
    int* pi = Get();

    *pi = 5;

    return 0;
}
```

Le tas :
Allocation dynamique

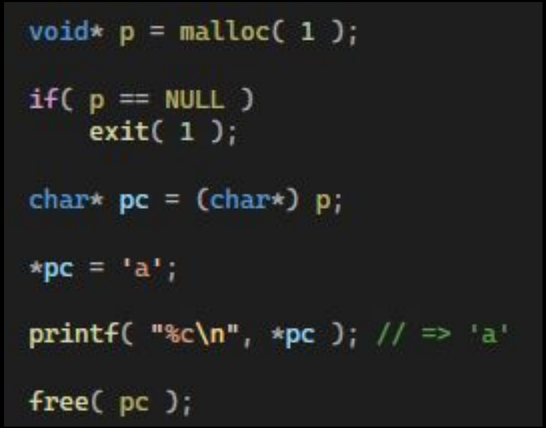


```c
void* p = malloc( 1 );

if( p == NULL )
    exit(1);

free( p );
```

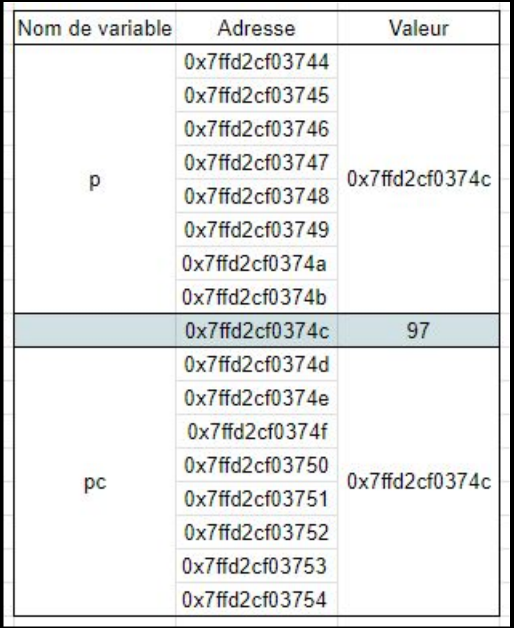


Nom de variable	Adresse	Valeur
p	0x7ffd2cf03744	0x7ffd2cf0374c
	0x7ffd2cf03745	
	0x7ffd2cf03746	
	0x7ffd2cf03747	
	0x7ffd2cf03748	
	0x7ffd2cf03749	
	0x7ffd2cf0374a	
	0x7ffd2cf0374b	
	0x7ffd2cf0374c	

Le tas :
Allocation dynamique

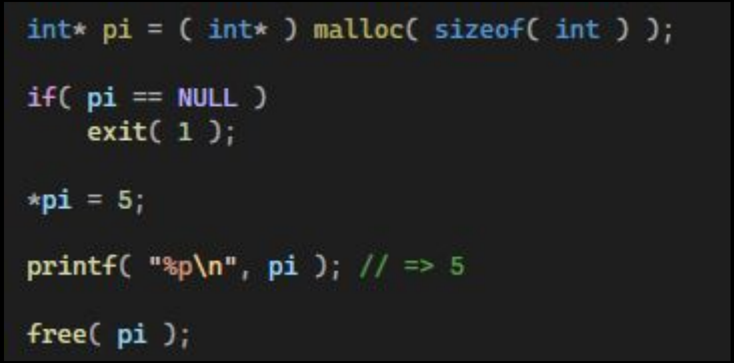


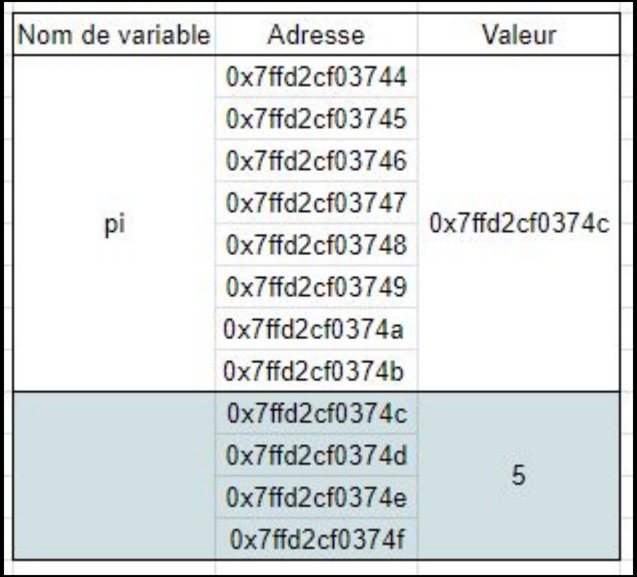
```c
void* p = malloc( 1 );

if( p == NULL )
    exit( 1 );

char* pc = (char*) p;

*pc = 'a';

printf( "%c\n", *pc ); // => 'a'

free( pc );
```



Nom de variable	Adresse	Valeur
p	0x7ffd2cf03744	0x7ffd2cf0374c
	0x7ffd2cf03745	
	0x7ffd2cf03746	
	0x7ffd2cf03747	
	0x7ffd2cf03748	
	0x7ffd2cf03749	
	0x7ffd2cf0374a	
	0x7ffd2cf0374b	
	0x7ffd2cf0374c	97
pc	0x7ffd2cf0374d	0x7ffd2cf0374c
	0x7ffd2cf0374e	
	0x7ffd2cf0374f	
	0x7ffd2cf03750	
	0x7ffd2cf03751	
	0x7ffd2cf03752	
	0x7ffd2cf03753	
	0x7ffd2cf03754	

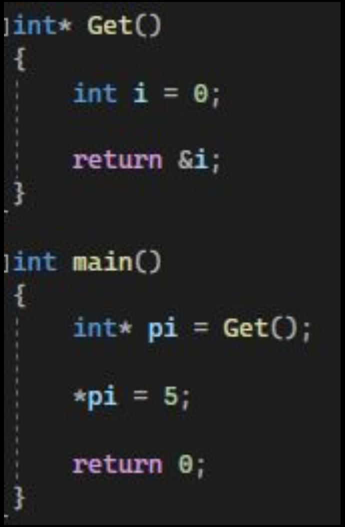
Le tas :
Allocation dynamique


```
int* pi = ( int* ) malloc( sizeof( int ) );

if( pi == NULL )
    exit( 1 );

*pi = 5;

printf( "%p\n", pi ); // => 5

free( pi );
```



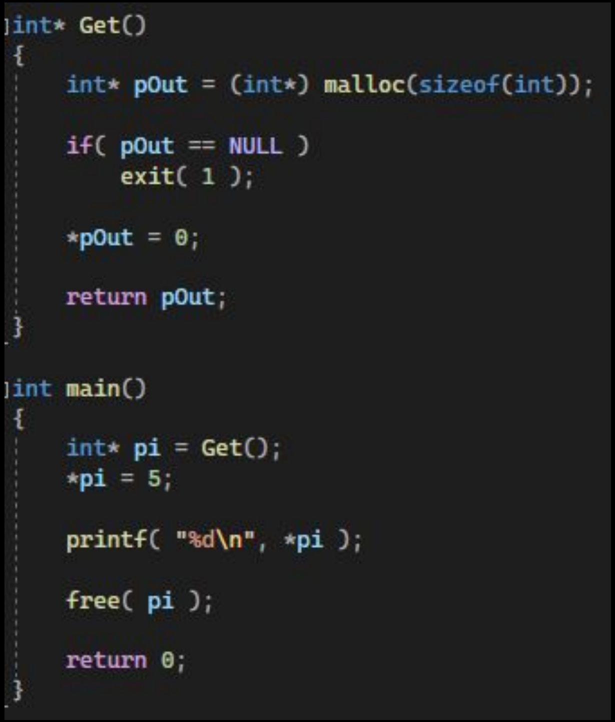
Nom de variable	Adresse	Valeur
pi	0x7ffd2cf03744	0x7ffd2cf0374c
	0x7ffd2cf03745	
	0x7ffd2cf03746	
	0x7ffd2cf03747	
	0x7ffd2cf03748	
	0x7ffd2cf03749	
	0x7ffd2cf0374a	
	0x7ffd2cf0374b	
	0x7ffd2cf0374c	5
	0x7ffd2cf0374d	
	0x7ffd2cf0374e	
	0x7ffd2cf0374f	

Le tas :
Allocation dynamique



```c
int* Get()
{
    int i = 0;

    return &i;
}

int main()
{
    int* pi = Get();

    *pi = 5;

    return 0;
}
```

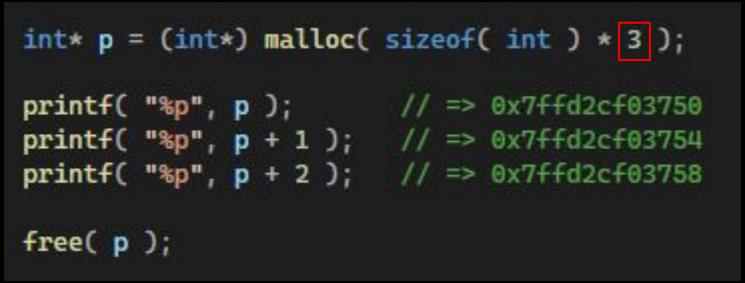
✗



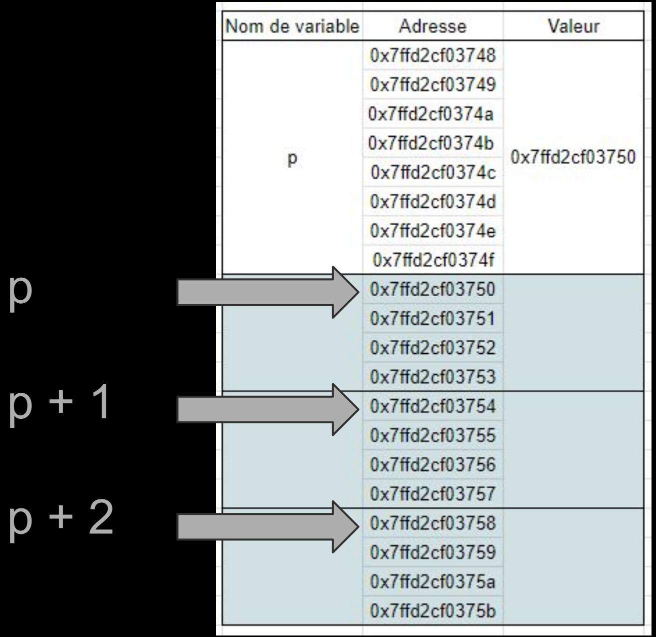
```c
int* Get()
{
    int* pOut = (int*) malloc(sizeof(int));

    if( pOut == NULL )
        exit( 1 );

    *pOut = 0;

    return pOut;
}

int main()
{
    int* pi = Get();
    *pi = 5;

    printf( "%d\n", *pi );

    free( pi );

    return 0;
}
```

✓

Le tas :
Arithmétique des pointeurs

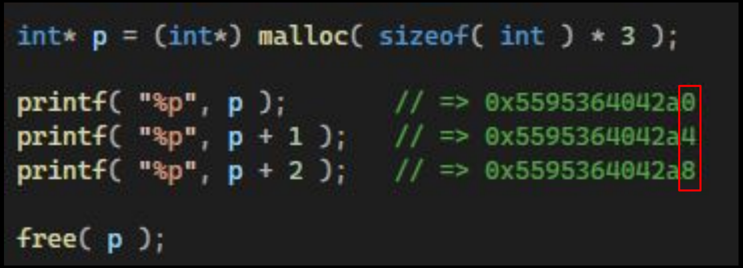


```c
int* p = (int*) malloc( sizeof( int ) * 3 );

printf( "%p", p );        // => 0x7ffd2cf03750
printf( "%p", p + 1 );    // => 0x7ffd2cf03754
printf( "%p", p + 2 );    // => 0x7ffd2cf03758

free( p );
```

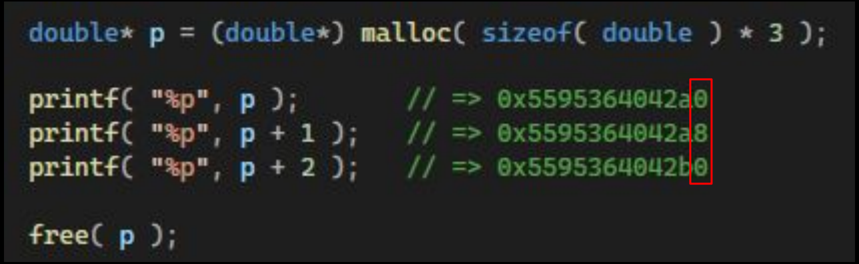


Nom de variable	Adresse	Valeur
p	0x7ffd2cf03748	0x7ffd2cf03750
	0x7ffd2cf03749	
	0x7ffd2cf0374a	
	0x7ffd2cf0374b	
	0x7ffd2cf0374c	
	0x7ffd2cf0374d	
	0x7ffd2cf0374e	
	0x7ffd2cf0374f	
	0x7ffd2cf03750	
	0x7ffd2cf03751	
	0x7ffd2cf03752	
	0x7ffd2cf03753	
	0x7ffd2cf03754	
	0x7ffd2cf03755	
	0x7ffd2cf03756	
	0x7ffd2cf03757	
	0x7ffd2cf03758	
	0x7ffd2cf03759	
	0x7ffd2cf0375a	
	0x7ffd2cf0375b	

Le tas :
Arithmétique des pointeurs

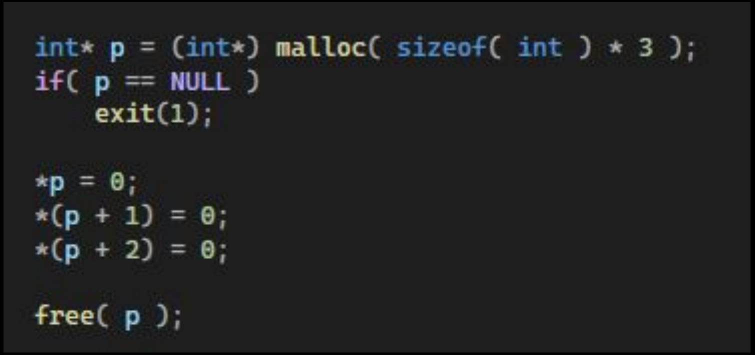


```c
int* p = (int*) malloc( sizeof( int ) * 3 );

printf( "%p", p );         // => 0x5595364042a0
printf( "%p", p + 1 );     // => 0x5595364042a4
printf( "%p", p + 2 );     // => 0x5595364042a8

free( p );
```

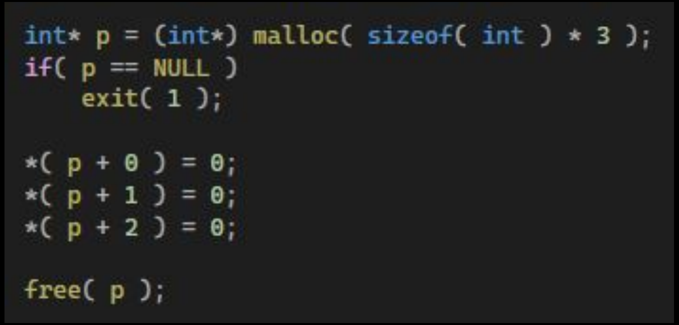


```c
double* p = (double*) malloc( sizeof( double ) * 3 );

printf( "%p", p );         // => 0x5595364042a0
printf( "%p", p + 1 );     // => 0x5595364042a8
printf( "%p", p + 2 );     // => 0x5595364042b0

free( p );
```

Le tas :
Arithmétique des pointeurs

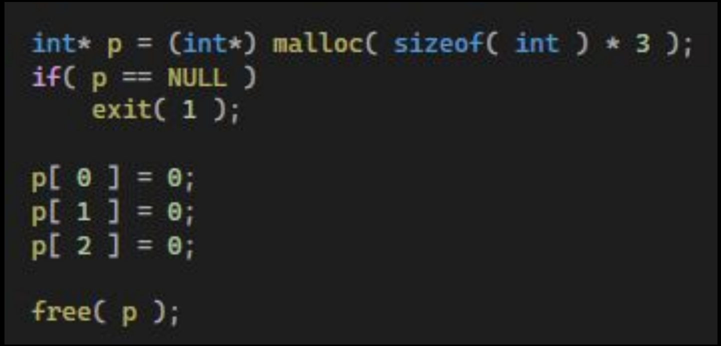


```c
int* p = (int*) malloc( sizeof( int ) * 3 );
if( p == NULL )
    exit(1);

*p = 0;
*(p + 1) = 0;
*(p + 2) = 0;

free( p );
```



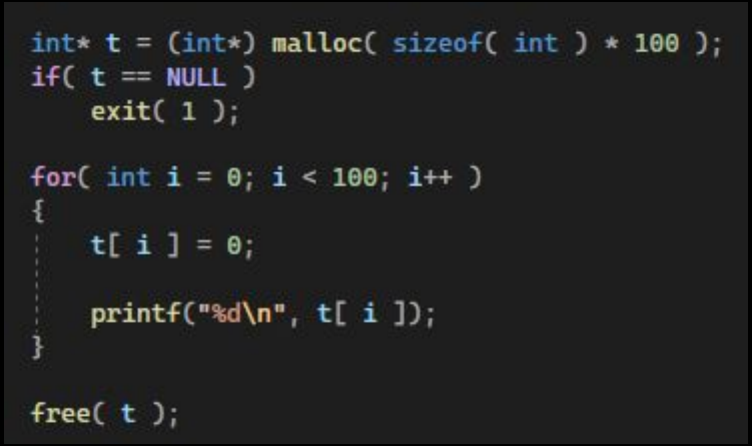
```c
int* p = (int*) malloc( sizeof( int ) * 3 );
if( p == NULL )
    exit( 1 );

*( p + 0 ) = 0;
*( p + 1 ) = 0;
*( p + 2 ) = 0;

free( p );
```

Le tas :
Arithmétique des pointeurs

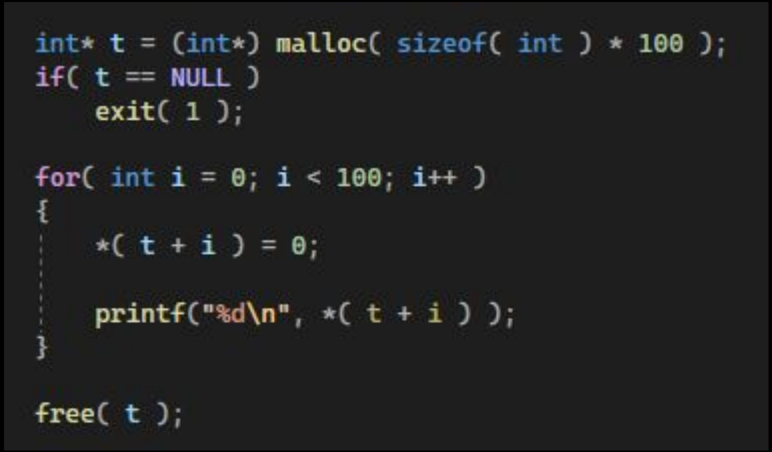


```c
int* p = (int*) malloc( sizeof( int ) * 3 );
if( p == NULL )
    exit( 1 );

p[ 0 ] = 0;
p[ 1 ] = 0;
p[ 2 ] = 0;

free( p );
```

Les tableaux

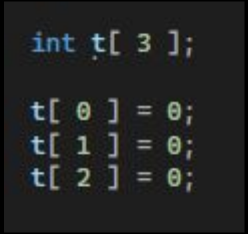


```c
int* t = (int*) malloc( sizeof( int ) * 100 );
if( t == NULL )
    exit( 1 );

for( int i = 0; i < 100; i++ )
{
    t[ i ] = 0;

    printf("%d\n", t[ i ]);
}

free( t );
```

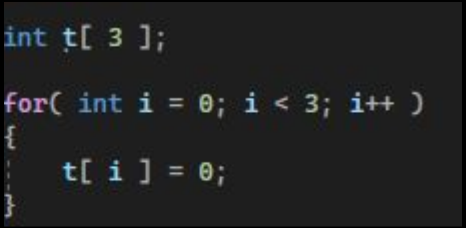


```c
int* t = (int*) malloc( sizeof( int ) * 100 );
if( t == NULL )
    exit( 1 );

for( int i = 0; i < 100; i++ )
{
    *( t + i ) = 0;

    printf("%d\n", *( t + i ) );
}

free( t );
```

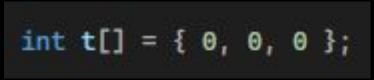
Les tableaux



```c
int t[ 3 ];

t[ 0 ] = 0;
t[ 1 ] = 0;
t[ 2 ] = 0;
```

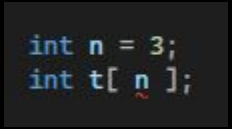


```c
int t[ 3 ];

for( int i = 0; i < 3; i++ )
{
    t[ i ] = 0;
}
```



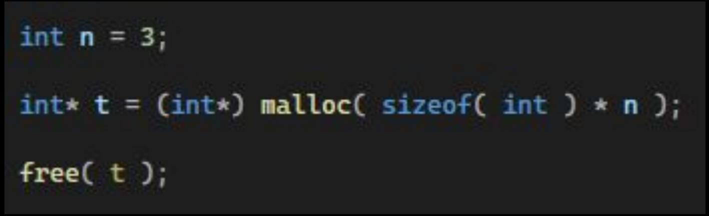
```c
int t[] = { 0, 0, 0 };
```

Les tableaux



```c
int n = 3;
int t[ n ];
```

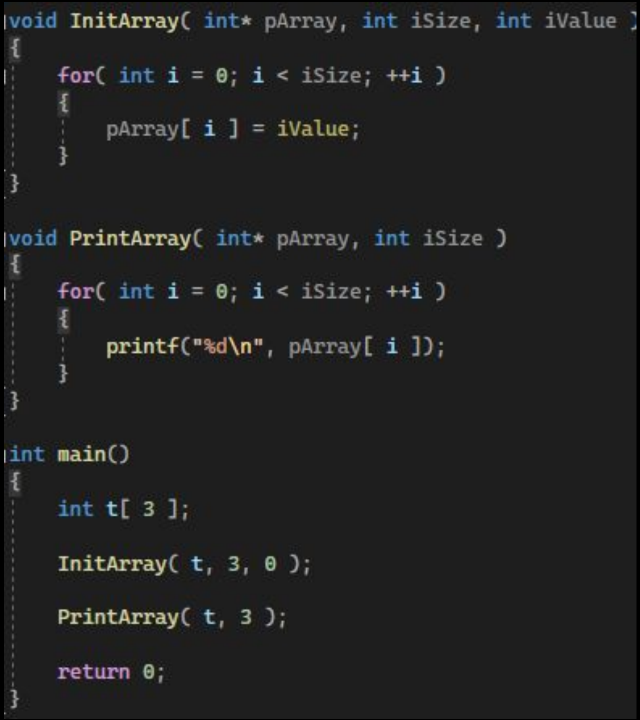
✗



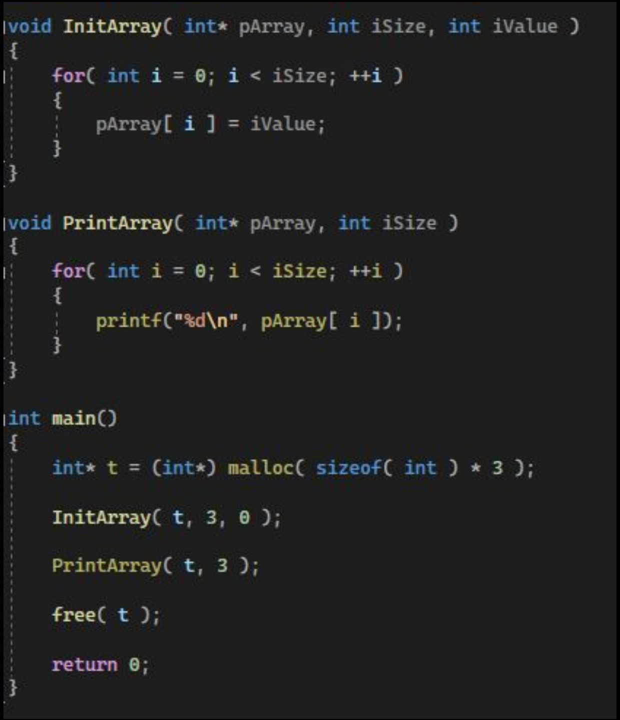
```c
int n = 3;

int* t = (int*) malloc( sizeof( int ) * n );

free( t );
```

✓

Les tableaux :
Passage en paramètre

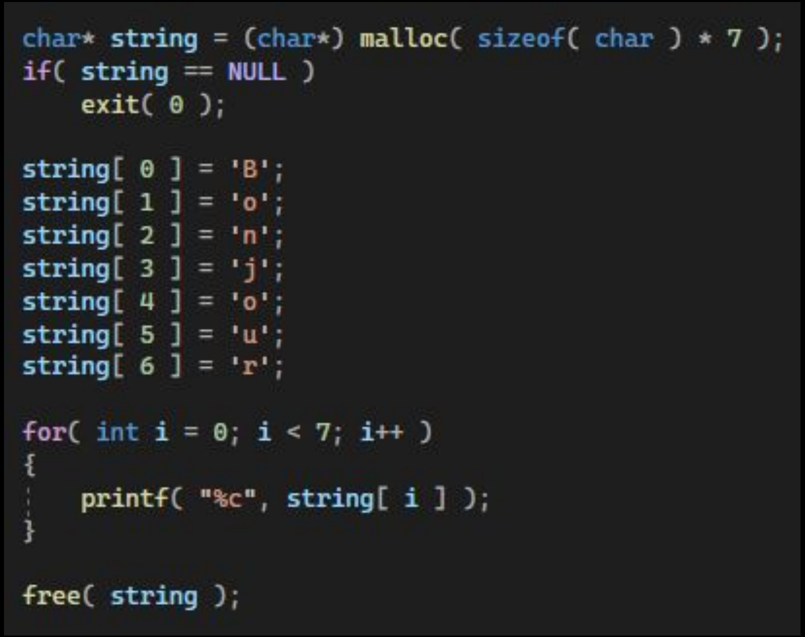


```c
void InitArray( int* pArray, int iSize, int iValue )
{
    for( int i = 0; i < iSize; ++i )
    {
        pArray[ i ] = iValue;
    }
}

void PrintArray( int* pArray, int iSize )
{
    for( int i = 0; i < iSize; ++i )
    {
        printf("%d\n", pArray[ i ]);
    }
}

int main()
{
    int t[ 3 ];

    InitArray( t, 3, 0 );

    PrintArray( t, 3 );

    return 0;
}
```



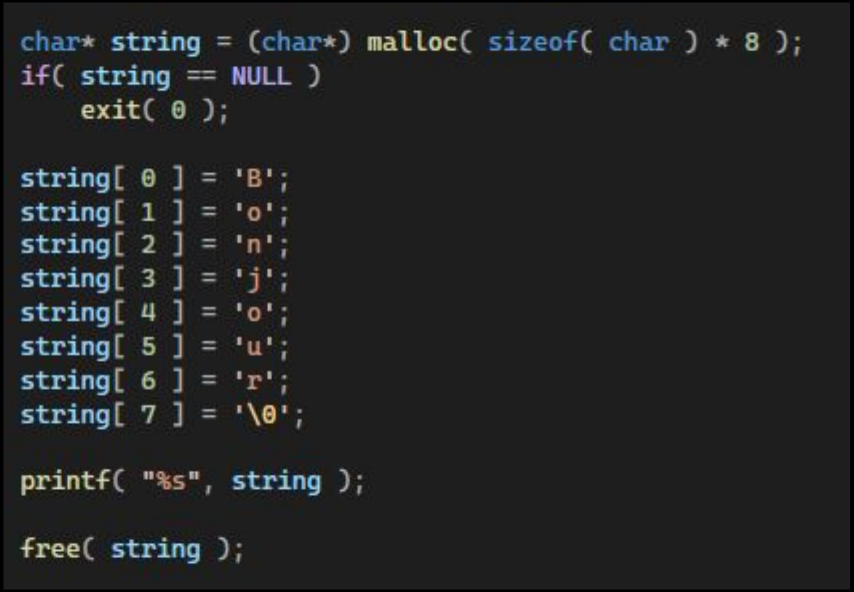
```c
void InitArray( int* pArray, int iSize, int iValue )
{
    for( int i = 0; i < iSize; ++i )
    {
        pArray[ i ] = iValue;
    }
}

void PrintArray( int* pArray, int iSize )
{
    for( int i = 0; i < iSize; ++i )
    {
        printf("%d\n", pArray[ i ]);
    }
}

int main()
{
    int* t = (int*) malloc( sizeof( int ) * 3 );

    InitArray( t, 3, 0 );

    PrintArray( t, 3 );

    free( t );

    return 0;
}
```

Les string



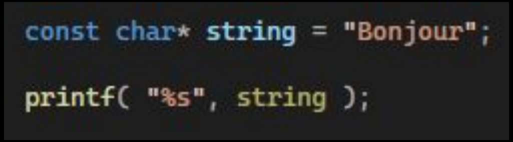
```c
char* string = (char*) malloc( sizeof( char ) * 7 );
if( string == NULL )
    exit( 0 );

string[ 0 ] = 'B';
string[ 1 ] = 'o';
string[ 2 ] = 'n';
string[ 3 ] = 'j';
string[ 4 ] = 'o';
string[ 5 ] = 'u';
string[ 6 ] = 'r';

for( int i = 0; i < 7; i++ )
{
    printf( "%c", string[ i ] );
}

free( string );
```

Les string

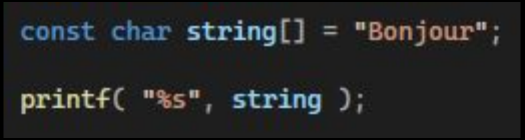


```c
char* string = (char*) malloc( sizeof( char ) * 8 );
if( string == NULL )
    exit( 0 );

string[ 0 ] = 'B';
string[ 1 ] = 'o';
string[ 2 ] = 'n';
string[ 3 ] = 'j';
string[ 4 ] = 'o';
string[ 5 ] = 'u';
string[ 6 ] = 'r';
string[ 7 ] = '\0';

printf( "%s", string );

free( string );
```

Les string

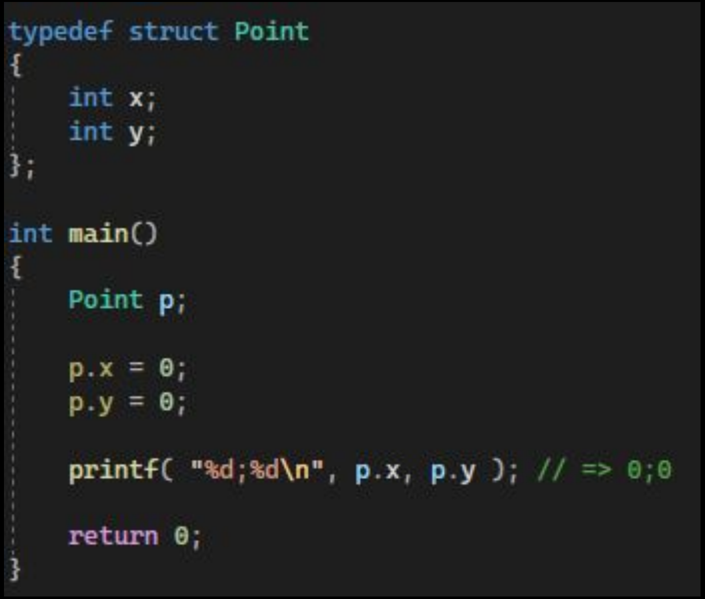


```c
const char* string = "Bonjour";

printf( "%s", string );
```



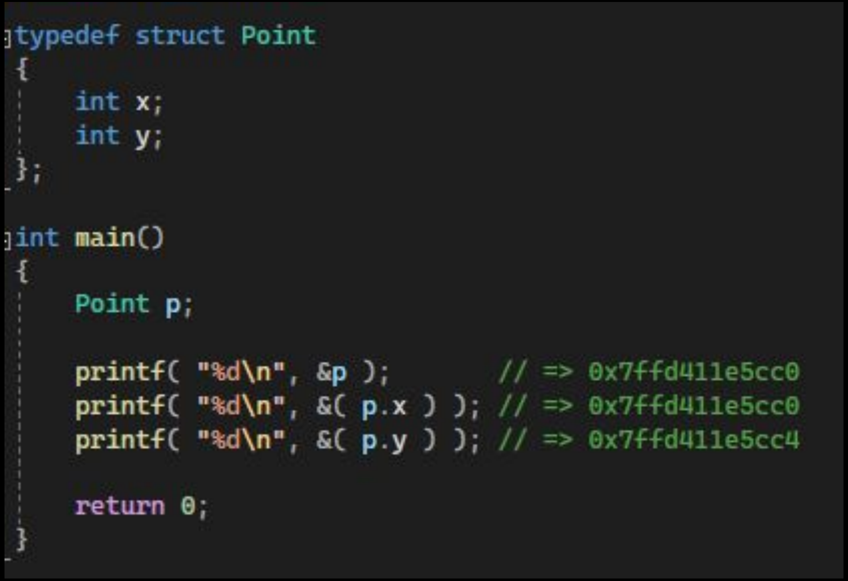
```c
const char string[] = "Bonjour";

printf( "%s", string );
```

Les struct



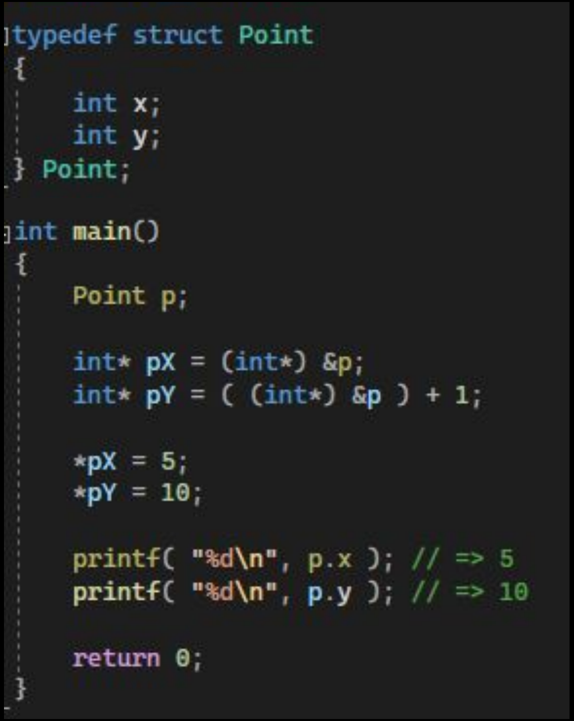
```c
typedef struct Point
{
    int x;
    int y;
};

int main()
{
    Point p;

    p.x = 0;
    p.y = 0;

    printf( "%d;%d\n", p.x, p.y ); // => 0;0

    return 0;
}
```

Les struct



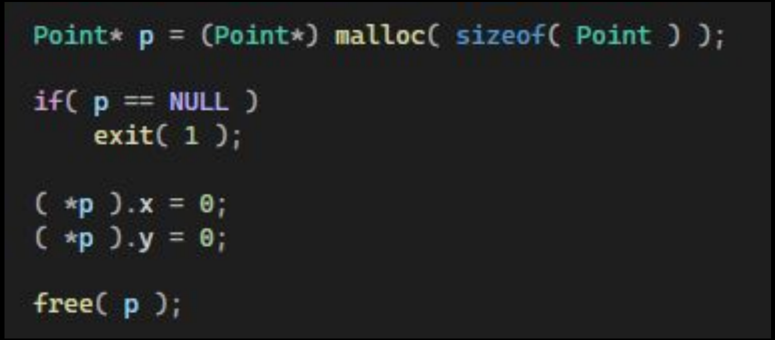
```c
typedef struct Point
{
    int x;
    int y;
};

int main()
{
    Point p;

    printf( "%d\n", &p );          // => 0x7ffd411e5cc0
    printf( "%d\n", &( p.x ) ); // => 0x7ffd411e5cc0
    printf( "%d\n", &( p.y ) ); // => 0x7ffd411e5cc4

    return 0;
}
```

Les struct

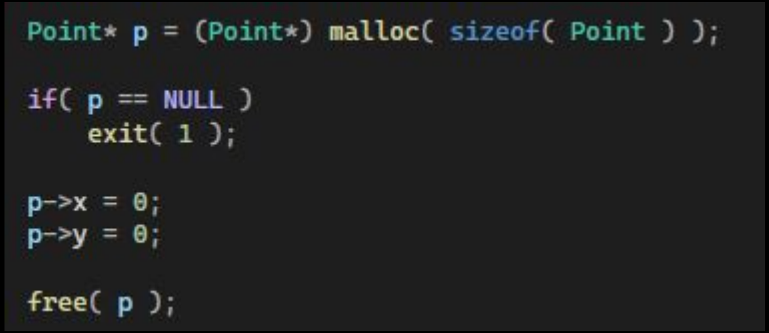


```c
typedef struct Point
{
    int x;
    int y;
} Point;

int main()
{
    Point p;

    int* pX = (int*) &p;
    int* pY = ( (int*) &p ) + 1;

    *pX = 5;
    *pY = 10;

    printf( "%d\n", p.x ); // => 5
    printf( "%d\n", p.y ); // => 10

    return 0;
}
```

Les struct

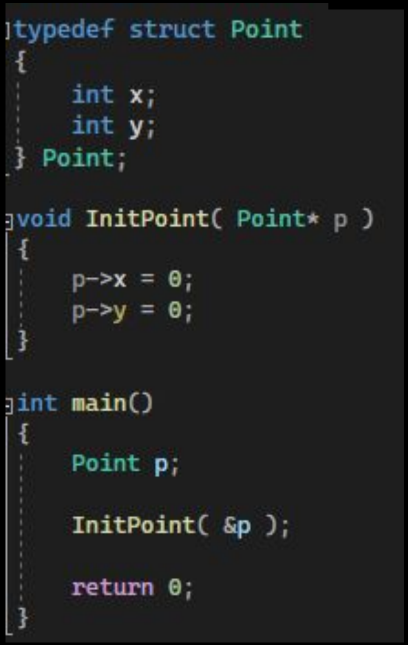


```c
Point* p = (Point*) malloc( sizeof( Point ) );

if( p == NULL )
    exit( 1 );

( *p ).x = 0;
( *p ).y = 0;

free( p );
```



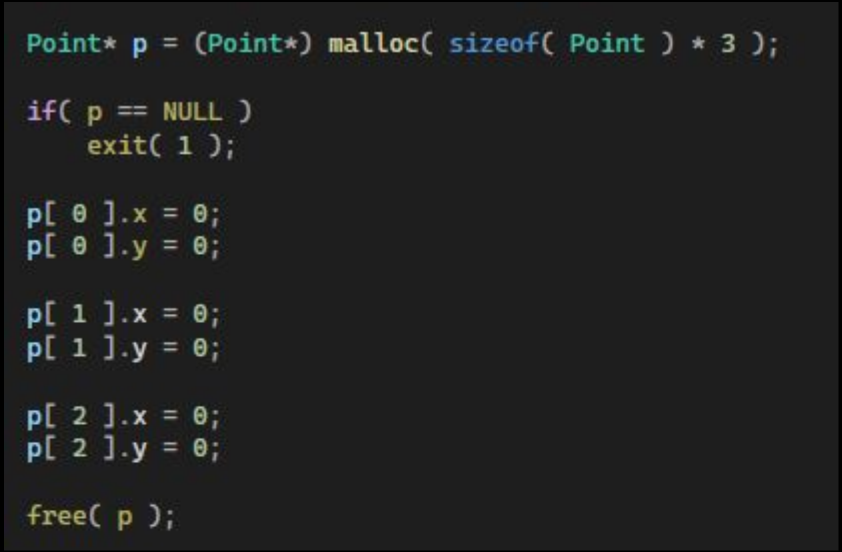
```c
Point* p = (Point*) malloc( sizeof( Point ) );

if( p == NULL )
    exit( 1 );

p->x = 0;
p->y = 0;

free( p );
```

Les struct



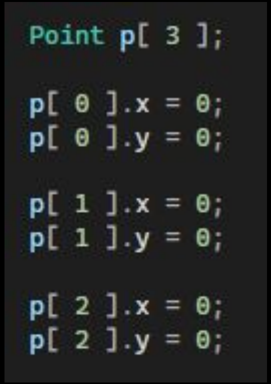
```
typedef struct Point
{
    int x;
    int y;
} Point;

void InitPoint( Point* p )
{
    p->x = 0;
    p->y = 0;
}

int main()
{
    Point p;

    InitPoint( &p );

    return 0;
}
```

Les struct



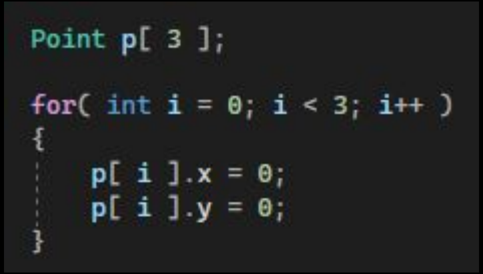
```c
Point* p = (Point*) malloc( sizeof( Point ) * 3 );

if( p == NULL )
    exit( 1 );

p[ 0 ].x = 0;
p[ 0 ].y = 0;

p[ 1 ].x = 0;
p[ 1 ].y = 0;

p[ 2 ].x = 0;
p[ 2 ].y = 0;

free( p );
```

Les struct

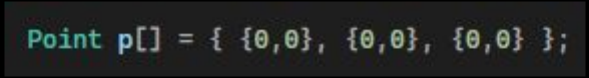


```
Point p[ 3 ];

p[ 0 ].x = 0;
p[ 0 ].y = 0;

p[ 1 ].x = 0;
p[ 1 ].y = 0;

p[ 2 ].x = 0;
p[ 2 ].y = 0;
```

Les struct

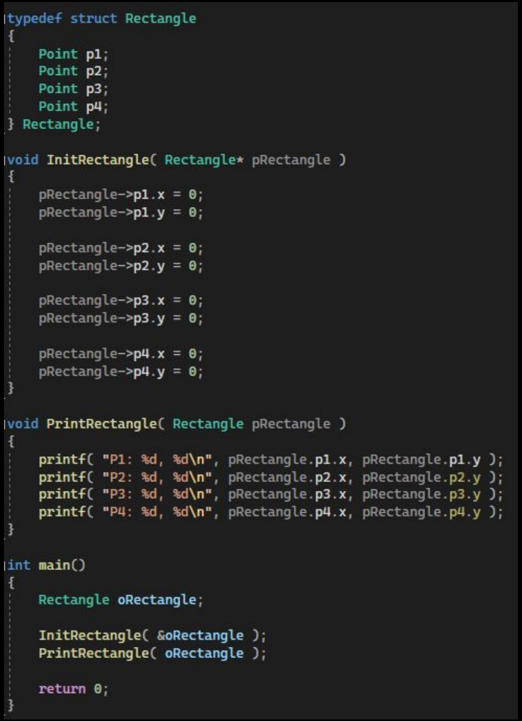


```c
Point p[ 3 ];

for( int i = 0; i < 3; i++ )
{
    p[ i ].x = 0;
    p[ i ].y = 0;
}
```

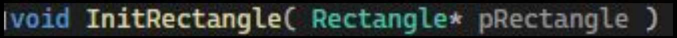


```c
Point p[] = { {0,0}, {0,0}, {0,0} };
```

Envoi par valeur/adresse

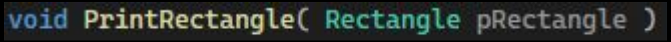


```c
typedef struct Rectangle
{
    Point p1;
    Point p2;
    Point p3;
    Point p4;
} Rectangle;

void InitRectangle( Rectangle* pRectangle )
{
    pRectangle->p1.x = 0;
    pRectangle->p1.y = 0;

    pRectangle->p2.x = 0;
    pRectangle->p2.y = 0;

    pRectangle->p3.x = 0;
    pRectangle->p3.y = 0;

    pRectangle->p4.x = 0;
    pRectangle->p4.y = 0;
}

void PrintRectangle( Rectangle pRectangle )
{
    printf( "P1: %d, %d\n", pRectangle.p1.x, pRectangle.p1.y );
    printf( "P2: %d, %d\n", pRectangle.p2.x, pRectangle.p2.y );
    printf( "P3: %d, %d\n", pRectangle.p3.x, pRectangle.p3.y );
    printf( "P4: %d, %d\n", pRectangle.p4.x, pRectangle.p4.y );
}

int main()
{
    Rectangle oRectangle;

    InitRectangle( &oRectangle );
    PrintRectangle( oRectangle );

    return 0;
}
```



```c
void InitRectangle( Rectangle* pRectangle )
```

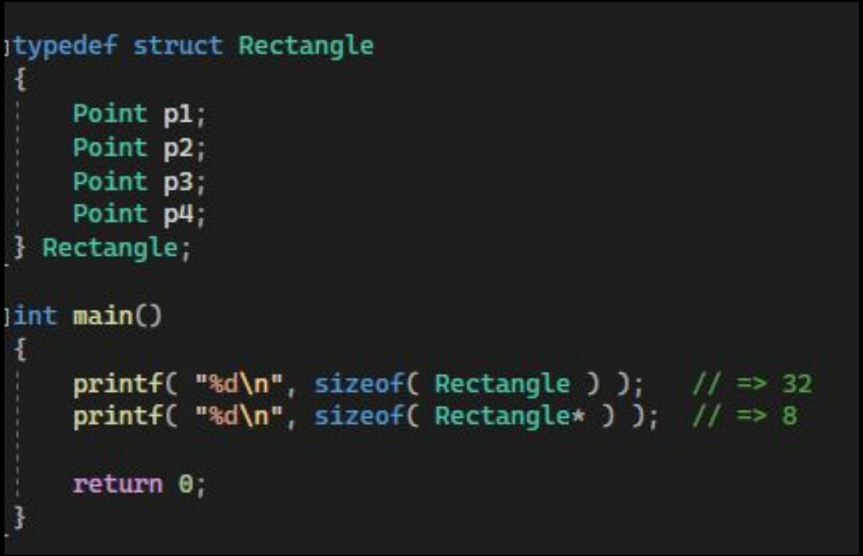
✓



```c
void PrintRectangle( Rectangle pRectangle )
```

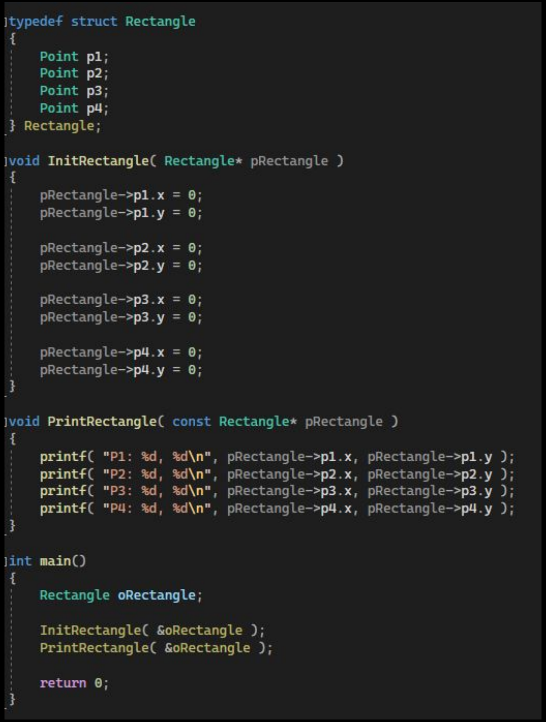
?

Envoi par valeur/adresse

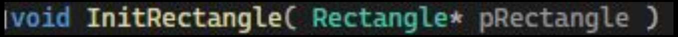


```c
typedef struct Rectangle
{
    Point p1;
    Point p2;
    Point p3;
    Point p4;
} Rectangle;

int main()
{
    printf( "%d\n", sizeof( Rectangle ) );   // => 32
    printf( "%d\n", sizeof( Rectangle* ) );  // => 8

    return 0;
}
```

Envoi par valeur/adresse

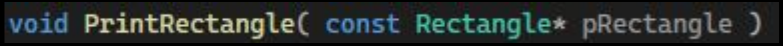


```c
typedef struct Rectangle
{
    Point p1;
    Point p2;
    Point p3;
    Point p4;
} Rectangle;

void InitRectangle( Rectangle* pRectangle )
{
    pRectangle->p1.x = 0;
    pRectangle->p1.y = 0;

    pRectangle->p2.x = 0;
    pRectangle->p2.y = 0;

    pRectangle->p3.x = 0;
    pRectangle->p3.y = 0;

    pRectangle->p4.x = 0;
    pRectangle->p4.y = 0;
}

void PrintRectangle( const Rectangle* pRectangle )
{
    printf( "P1: %d, %d\n", pRectangle->p1.x, pRectangle->p1.y );
    printf( "P2: %d, %d\n", pRectangle->p2.x, pRectangle->p2.y );
    printf( "P3: %d, %d\n", pRectangle->p3.x, pRectangle->p3.y );
    printf( "P4: %d, %d\n", pRectangle->p4.x, pRectangle->p4.y );
}

int main()
{
    Rectangle oRectangle;

    InitRectangle( &oRectangle );
    PrintRectangle( &oRectangle );

    return 0;
}
```



```c
void InitRectangle( Rectangle* pRectangle )
```

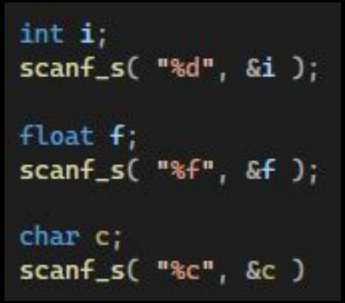
✓



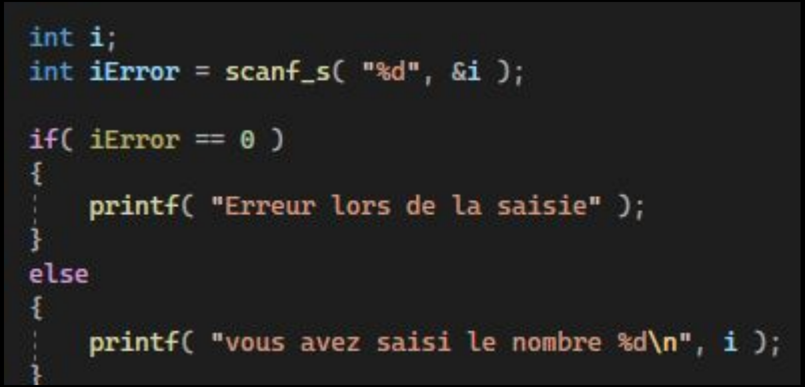
```c
void PrintRectangle( const Rectangle* pRectangle )
```

✓

Entrées

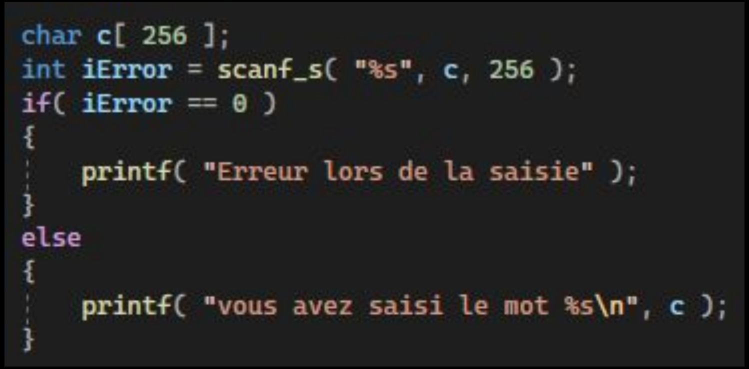

```
int i;
scanf_s( "%d", &i );

float f;
scanf_s( "%f", &f );

char c;
scanf_s( "%c", &c )
```

Entrées



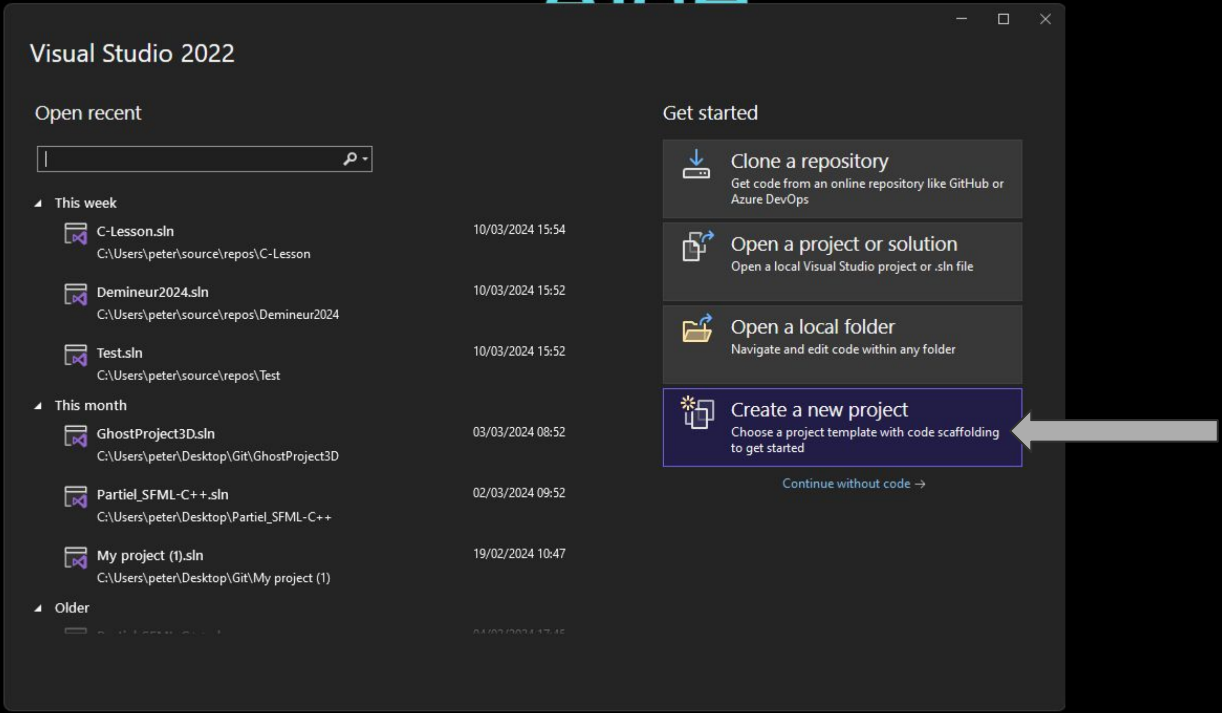
```c
int i;
int iError = scanf_s( "%d", &i );

if( iError == 0 )
{
    printf( "Erreur lors de la saisie" );
}
else
{
    printf( "vous avez saisi le nombre %d\n", i );
}
```

Entrées



```
char c[ 256 ];
int iError = scanf_s( "%s", c, 256 );
if( iError == 0 )
{
    printf( "Erreur lors de la saisie" );
}
else
{
    printf( "vous avez saisi le mot %s\n", c );
}
```

Aide :
Créer un projet



Visual Studio 2022

Open recent

This week

C-Lesson.sln — C:\Users\peter\source\repos\C-Lesson — 10/03/2024 15:54

Demineur2024.sln — C:\Users\peter\source\repos\Demineur2024 — 10/03/2024 15:52

Test.sln — C:\Users\peter\source\repos\Test — 10/03/2024 15:52

This month

GhostProject3D.sln — C:\Users\peter\Desktop\Git\GhostProject3D — 03/03/2024 08:52

Partiel_SFML-C++.sln — C:\Users\peter\Desktop\Partiel_SFML-C++ — 02/03/2024 09:52

My project (1).sln — C:\Users\peter\Desktop\Git\My project (1) — 19/02/2024 10:47

Older

Get started

Clone a repository
Get code from an online repository like GitHub or Azure DevOps

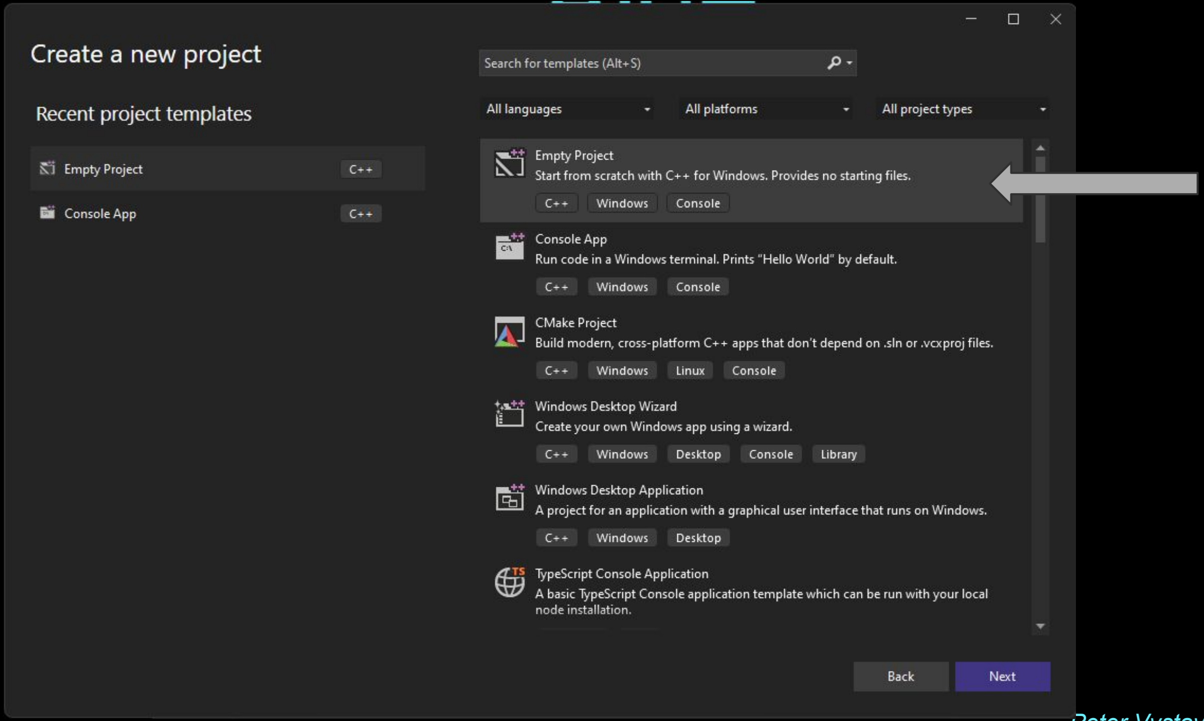
Open a project or solution
Open a local Visual Studio project or .sln file

Open a local folder
Navigate and edit code within any folder

Create a new project
Choose a project template with code scaffolding to get started

Continue without code →

Aide :
Créer un projet



Create a new project

Recent project templates

Empty Project	C++
Console App	C++

Search for templates (Alt+S)

All languages · All platforms · All project types

Empty Project
Start from scratch with C++ for Windows. Provides no starting files.
C++ · Windows · Console

Console App
Run code in a Windows terminal. Prints "Hello World" by default.
C++ · Windows · Console

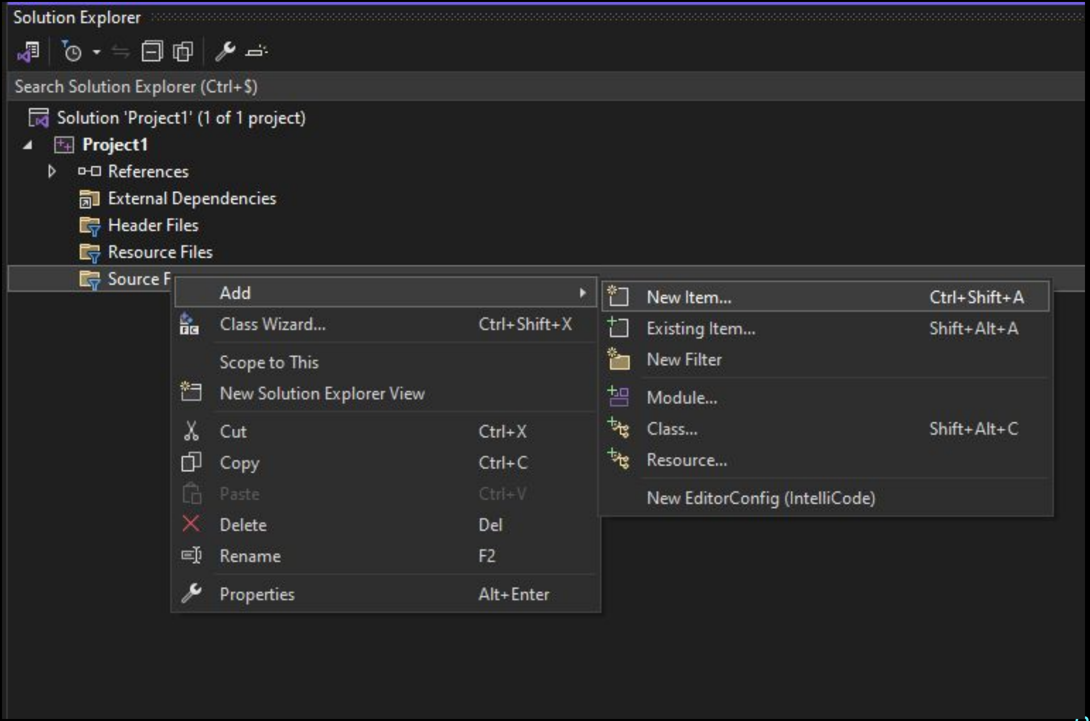
CMake Project
Build modern, cross-platform C++ apps that don't depend on .sln or .vcxproj files.
C++ · Windows · Linux · Console

Windows Desktop Wizard
Create your own Windows app using a wizard.
C++ · Windows · Desktop · Console · Library

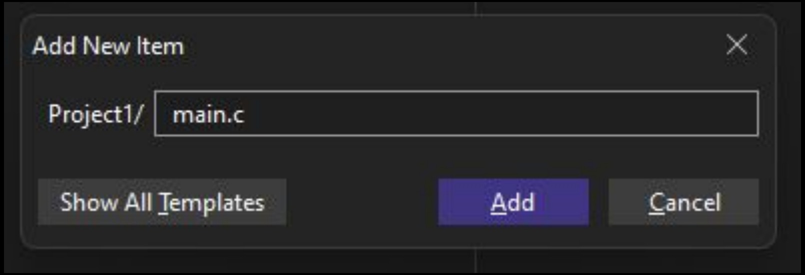
Windows Desktop Application
A project for an application with a graphical user interface that runs on Windows.
C++ · Windows · Desktop

TypeScript Console Application
A basic TypeScript Console application template which can be run with your local node installation.

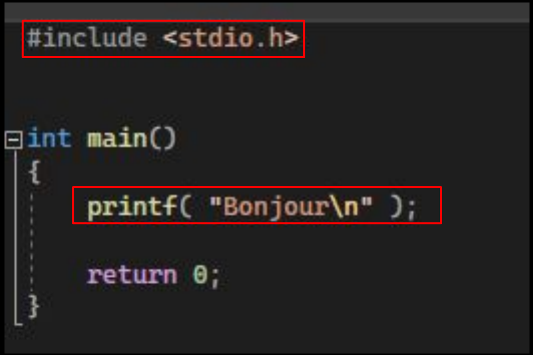
Aide :
Créer un projet



Aide :
Créer un projet

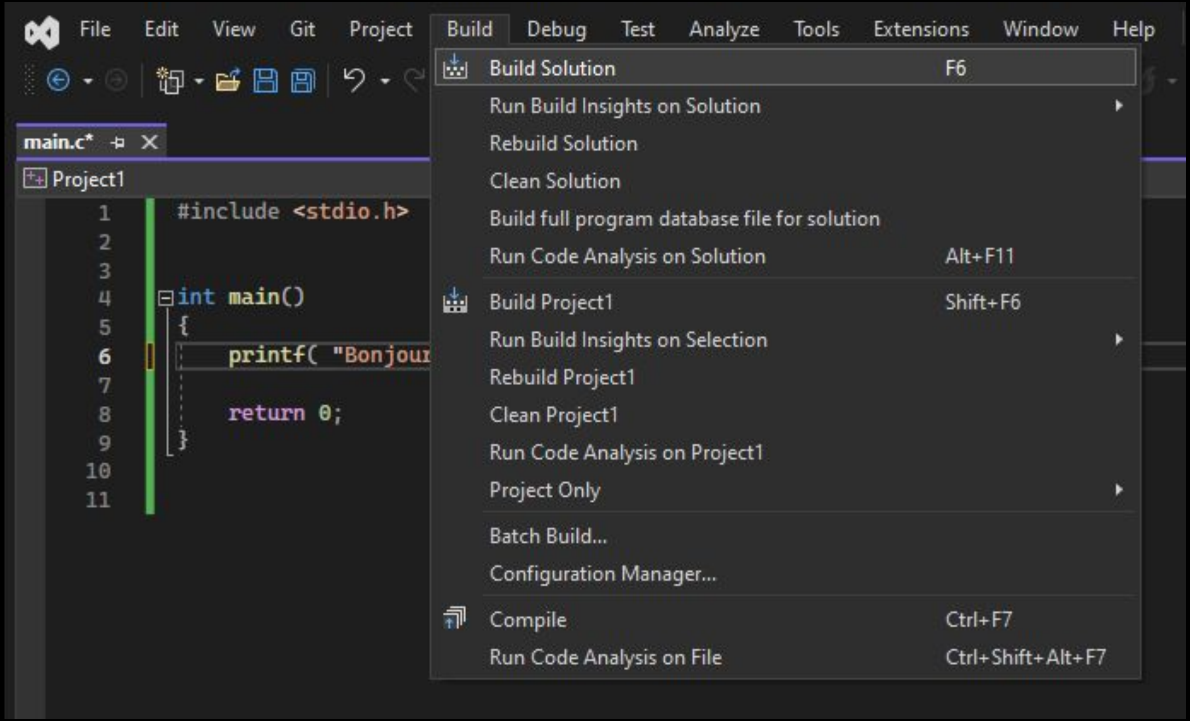


Aide :
Créer un projet



```
#include <stdio.h>


int main()
{
    printf( "Bonjour\n" );

    return 0;
}
```

Aide :
Compiler le programme



File Edit View Git Project Build Debug Test Analyze Tools Extensions Window Help

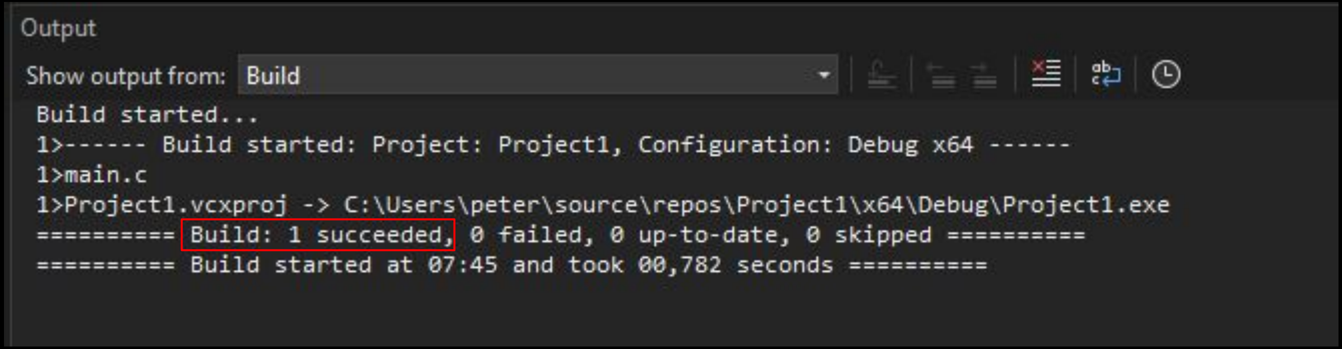
main.c*

Project1

```
#include <stdio.h>


int main()
{
    printf( "Bonjour

    return 0;
}
```

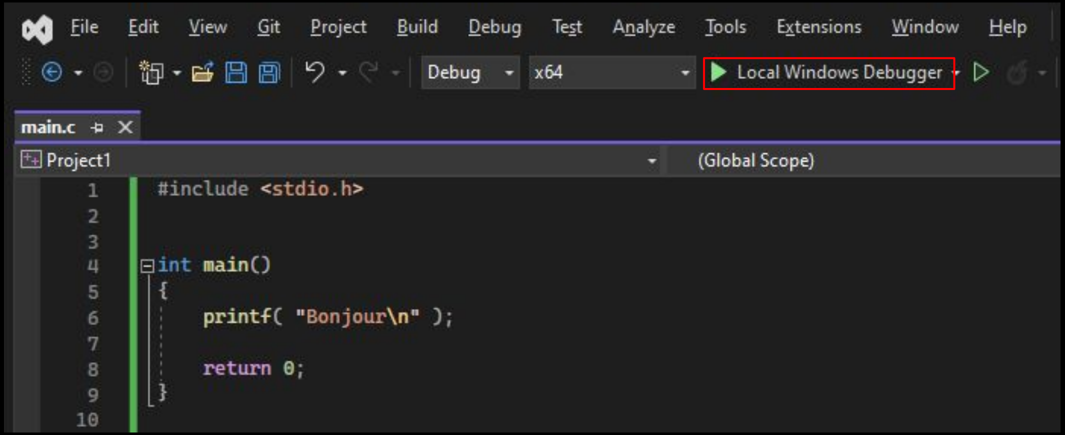
Build Solution	F6
Run Build Insights on Solution	
Rebuild Solution	
Clean Solution	
Build full program database file for solution	
Run Code Analysis on Solution	Alt+F11
Build Project1	Shift+F6
Run Build Insights on Selection	
Rebuild Project1	
Clean Project1	
Run Code Analysis on Project1	
Project Only	
Batch Build...	
Configuration Manager...	
Compile	Ctrl+F7
Run Code Analysis on File	Ctrl+Shift+Alt+F7

Aide :
Compiler le programme



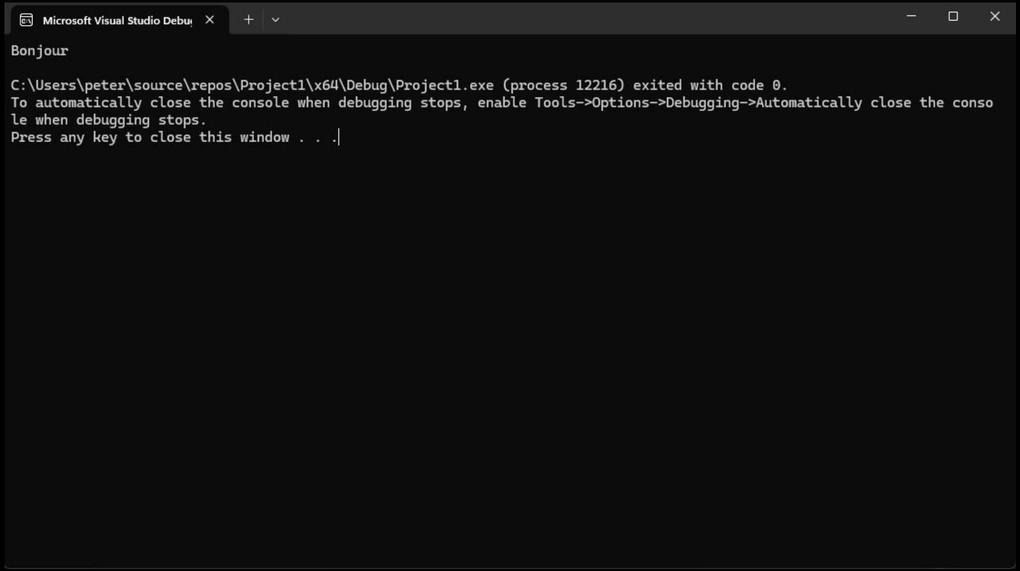
```
Build started...
1>------ Build started: Project: Project1, Configuration: Debug x64 ------
1>main.c
1>Project1.vcxproj -> C:\Users\peter\source\repos\Project1\x64\Debug\Project1.exe
========== Build: 1 succeeded, 0 failed, 0 up-to-date, 0 skipped ==========
========== Build started at 07:45 and took 00,782 seconds ==========
```

Aide :
Lancer le programme



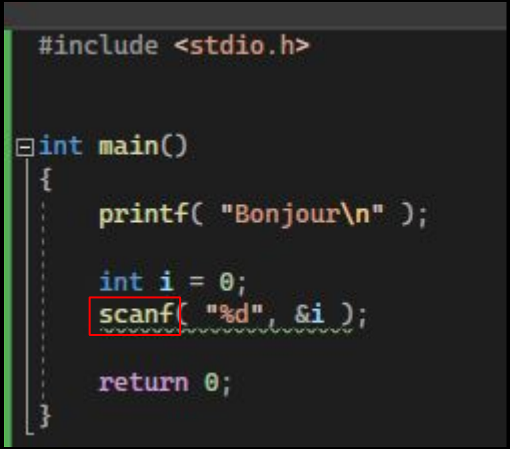
```c
#include <stdio.h>


int main()
{
    printf( "Bonjour\n" );

    return 0;
}
```

Aide :
Lancer le programme



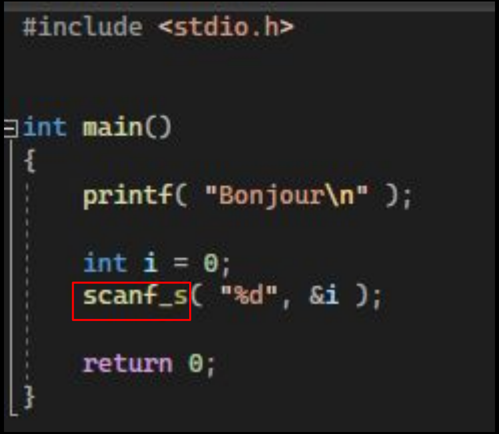
```
Bonjour

C:\Users\peter\source\repos\Project1\x64\Debug\Project1.exe (process 12216) exited with code 0.
To automatically close the console when debugging stops, enable Tools->Options->Debugging->Automatically close the conso
le when debugging stops.
Press any key to close this window . . .
```

Aide : scanf



```c
#include <stdio.h>


int main()
{
    printf( "Bonjour\n" );

    int i = 0;
    scanf( "%d", &i );

    return 0;
}
```

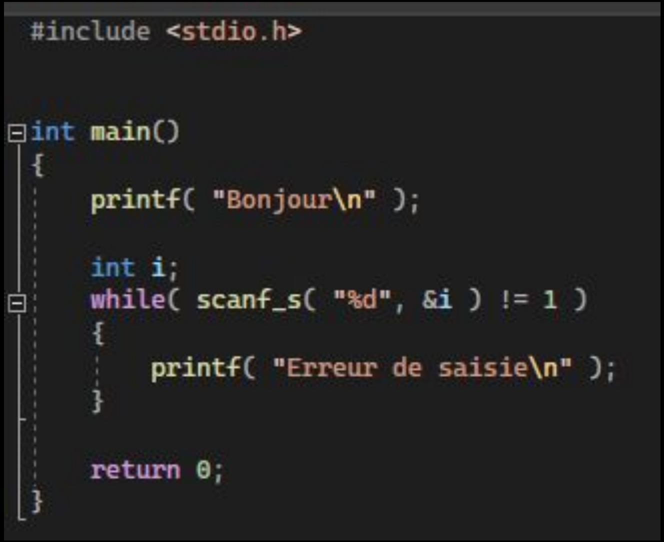
✗



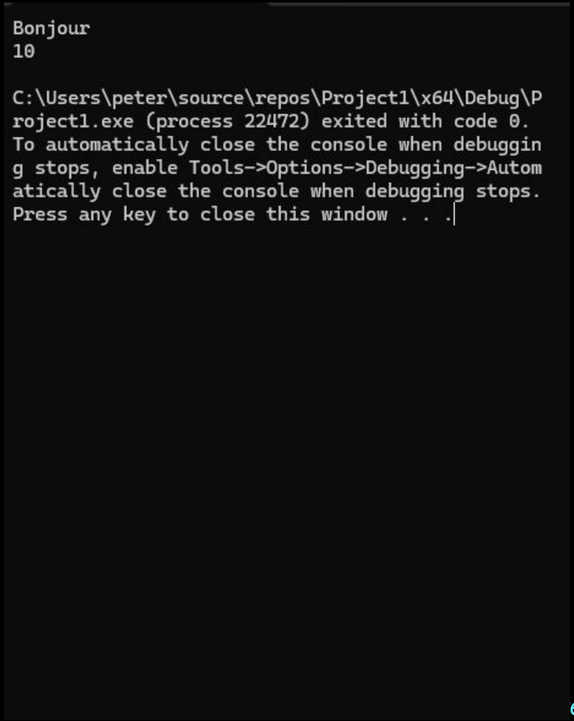
```c
#include <stdio.h>


int main()
{
    printf( "Bonjour\n" );

    int i = 0;
    scanf_s( "%d", &i );

    return 0;
}
```

✓

Aide : scanf

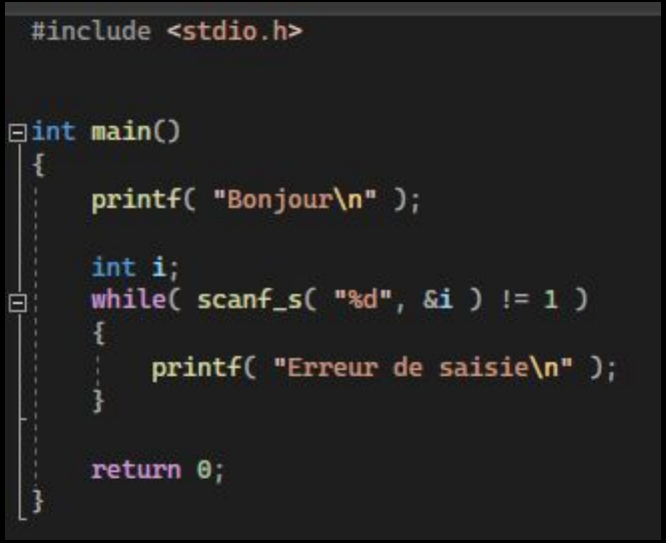


```c
#include <stdio.h>


int main()
{
    printf( "Bonjour\n" );

    int i;
    while( scanf_s( "%d", &i ) != 1 )
    {
        printf( "Erreur de saisie\n" );
    }

    return 0;
}
```

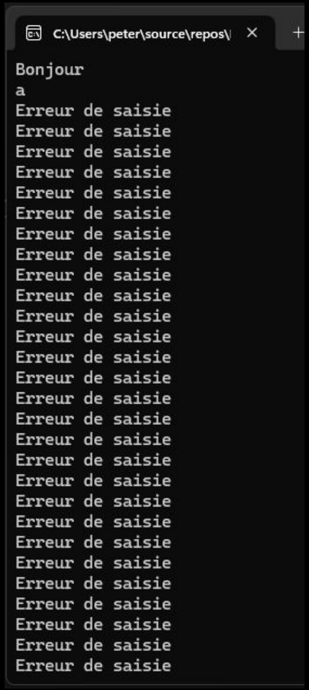


```
Bonjour
10

C:\Users\peter\source\repos\Project1\x64\Debug\P
roject1.exe (process 22472) exited with code 0.
To automatically close the console when debuggin
g stops, enable Tools->Options->Debugging->Autom
atically close the console when debugging stops.
Press any key to close this window . . .
```

Aide : scanf



```c
#include <stdio.h>


int main()
{
    printf( "Bonjour\n" );

    int i;
    while( scanf_s( "%d", &i ) != 1 )
    {
        printf( "Erreur de saisie\n" );
    }

    return 0;
}
```



```
Bonjour
a
Erreur de saisie
Erreur de saisie
Erreur de saisie
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Erreur de saisie
Erreur de saisie
Erreur de saisie
Erreur de saisie
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```
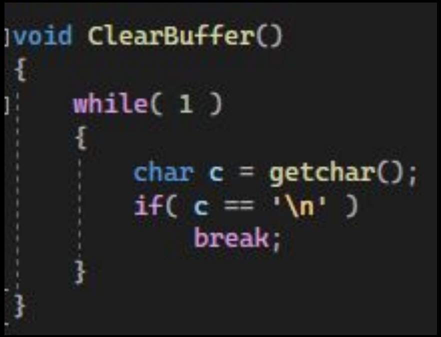
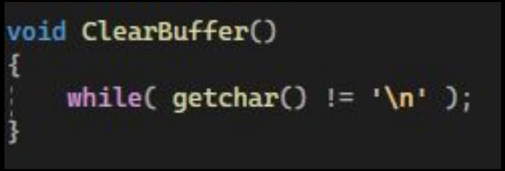

?

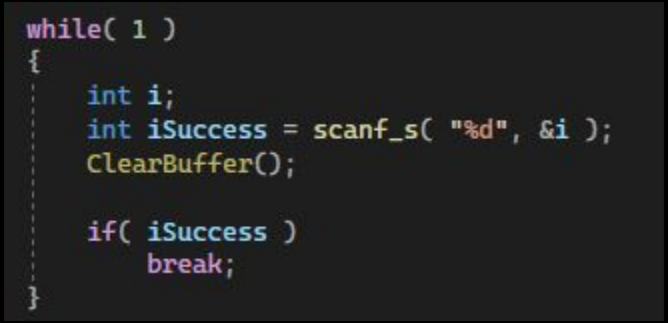
Aide : scanf



```c
void ClearBuffer()
{
	while( 1 )
	{
		char c = getchar();
		if( c == '\n' )
			break;
	}
}
```

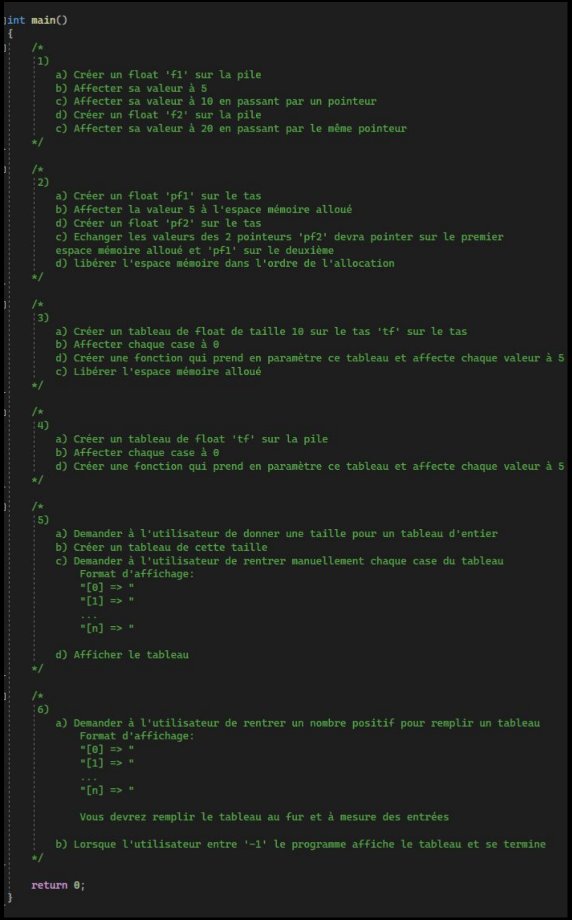


```c
void ClearBuffer()
{
	while( getchar() != '\n' );
}
```



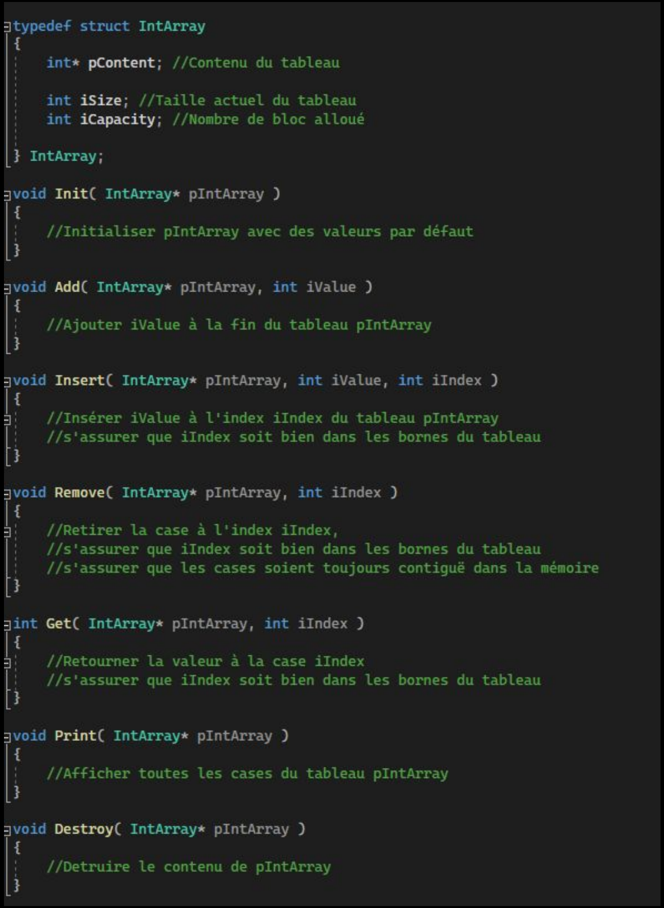
```c
while( 1 )
{
	int i;
	int iSuccess = scanf_s( "%d", &i );
	ClearBuffer();

	if( iSuccess )
		break;
}
```

Exercices: Pointeurs & Tableaux

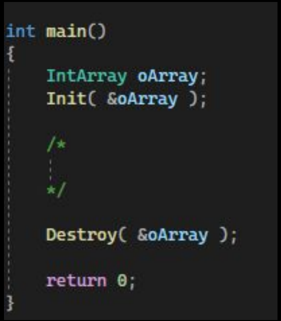


```c
int main()
{
    /*
    1)
        a) Créer un float 'f1' sur la pile
        b) Affecter sa valeur à 5
        c) Affecter sa valeur à 10 en passant par un pointeur
        d) Créer un float 'f2' sur la pile
        c) Affecter sa valeur à 20 en passant par le même pointeur
    */

    /*
    2)
        a) Créer un float 'pf1' sur le tas
        b) Affecter la valeur 5 à l'espace mémoire alloué
        d) Créer un float 'pf2' sur le tas
        c) Echanger les valeurs des 2 pointeurs 'pf2' devra pointer sur le premier
        espace mémoire alloué et 'pf1' sur le deuxième
        d) libérer l'espace mémoire dans l'ordre de l'allocation
    */

    /*
    3)
        a) Créer un tableau de float de taille 10 sur le tas 'tf' sur le tas
        b) Affecter chaque case à 0
        d) Créer une fonction qui prend en paramètre ce tableau et affecte chaque valeur à 5
        c) Libérer l'espace mémoire alloué
    */

    /*
    4)
        a) Créer un tableau de float 'tf' sur la pile
        b) Affecter chaque case à 0
        d) Créer une fonction qui prend en paramètre ce tableau et affecte chaque valeur à 5
    */

    /*
    5)
        a) Demander à l'utilisateur de donner une taille pour un tableau d'entier
        b) Créer un tableau de cette taille
        c) Demander à l'utilisateur de rentrer manuellement chaque case du tableau
            Format d'affichage:
            "[0] => "
            "[1] => "
            ...
            "[n] => "

        d) Afficher le tableau
    */

    /*
    6)
        a) Demander à l'utilisateur de rentrer un nombre positif pour remplir un tableau
            Format d'affichage:
            "[0] => "
            "[1] => "
            ...
            "[n] => "

            Vous devrez remplir le tableau au fur et à mesure des entrées

        b) Lorsque l'utilisateur entre '-1' le programme affiche le tableau et se termine
    */

    return 0;
}
```

Exercices: Tableaux dynamiques

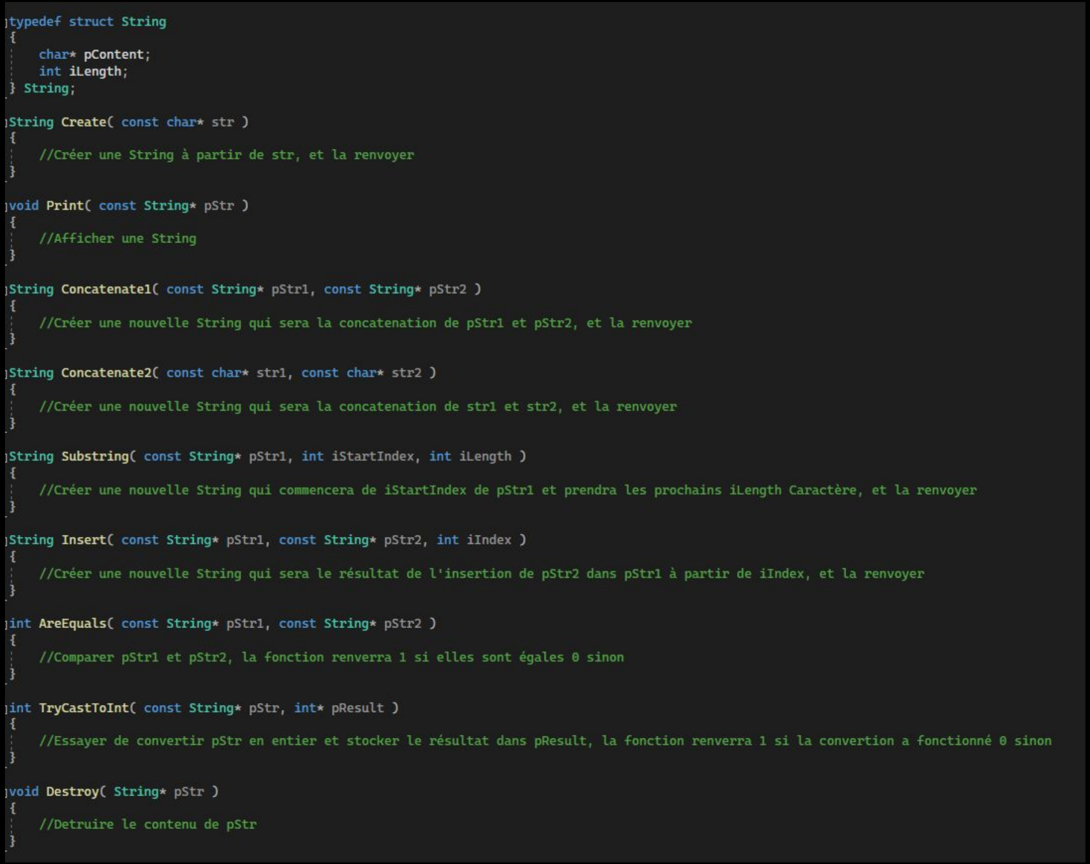


```c
typedef struct IntArray
{
    int* pContent; //Contenu du tableau

    int iSize; //Taille actuel du tableau
    int iCapacity; //Nombre de bloc alloué

} IntArray;

void Init( IntArray* pIntArray )
{
    //Initialiser pIntArray avec des valeurs par défaut
}

void Add( IntArray* pIntArray, int iValue )
{
    //Ajouter iValue à la fin du tableau pIntArray
}

void Insert( IntArray* pIntArray, int iValue, int iIndex )
{
    //Insérer iValue à l'index iIndex du tableau pIntArray
    //s'assurer que iIndex soit bien dans les bornes du tableau
}

void Remove( IntArray* pIntArray, int iIndex )
{
    //Retirer la case à l'index iIndex,
    //s'assurer que iIndex soit bien dans les bornes du tableau
    //s'assurer que les cases soient toujours contiguë dans la mémoire
}

int Get( IntArray* pIntArray, int iIndex )
{
    //Retourner la valeur à la case iIndex
    //s'assurer que iIndex soit bien dans les bornes du tableau
}

void Print( IntArray* pIntArray )
{
    //Afficher toutes les cases du tableau pIntArray
}

void Destroy( IntArray* pIntArray )
{
    //Detruire le contenu de pIntArray
}
```

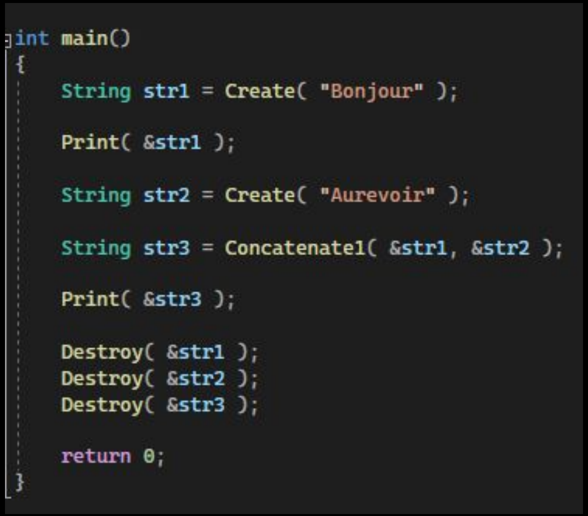


```c
int main()
{
    IntArray oArray;
    Init( &oArray );

    /*

    */

    Destroy( &oArray );

    return 0;
}
```

Exercices: Le type String

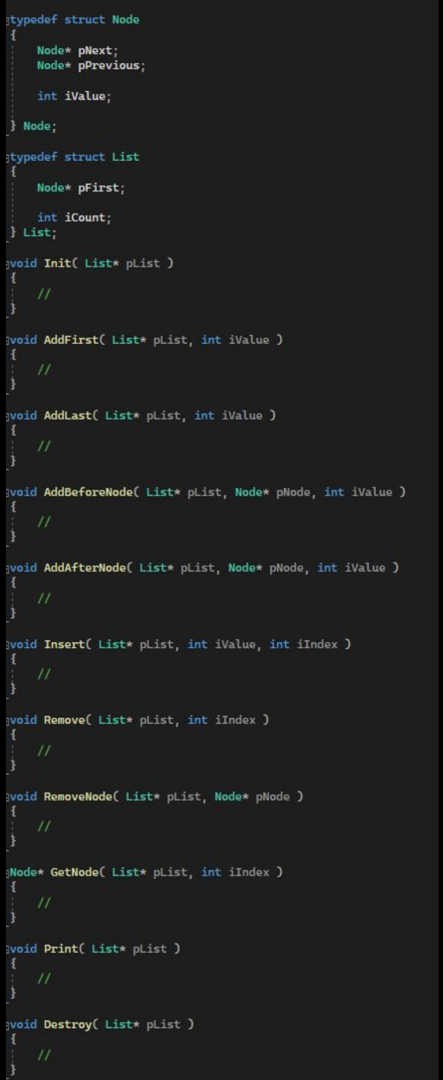


```c
typedef struct String
{
    char* pContent;
    int iLength;
} String;

String Create( const char* str )
{
    //Créer une String à partir de str, et la renvoyer
}

void Print( const String* pStr )
{
    //Afficher une String
}

String Concatenate1( const String* pStr1, const String* pStr2 )
{
    //Créer une nouvelle String qui sera la concatenation de pStr1 et pStr2, et la renvoyer
}

String Concatenate2( const char* str1, const char* str2 )
{
    //Créer une nouvelle String qui sera la concatenation de str1 et str2, et la renvoyer
}

String Substring( const String* pStr1, int iStartIndex, int iLength )
{
    //Créer une nouvelle String qui commencera de iStartIndex de pStr1 et prendra les prochains iLength Caractère, et la renvoyer
}

String Insert( const String* pStr1, const String* pStr2, int iIndex )
{
    //Créer une nouvelle String qui sera le résultat de l'insertion de pStr2 dans pStr1 à partir de iIndex, et la renvoyer
}

int AreEquals( const String* pStr1, const String* pStr2 )
{
    //Comparer pStr1 et pStr2, la fonction renverra 1 si elles sont égales 0 sinon
}

int TryCastToInt( const String* pStr, int* pResult )
{
    //Essayer de convertir pStr en entier et stocker le résultat dans pResult, la fonction renverra 1 si la convertion a fonctionné 0 sinon
}

void Destroy( String* pStr )
{
    //Detruire le contenu de pStr
}
```

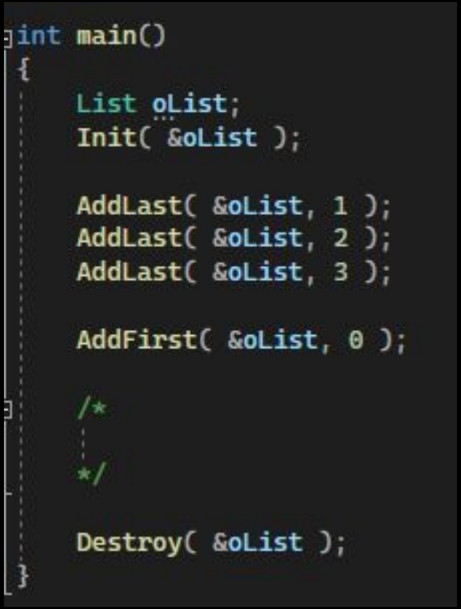


```c
int main()
{
    String str1 = Create( "Bonjour" );

    Print( &str1 );

    String str2 = Create( "Aurevoir" );

    String str3 = Concatenate1( &str1, &str2 );

    Print( &str3 );

    Destroy( &str1 );
    Destroy( &str2 );
    Destroy( &str3 );

    return 0;
}
```

Exercices: Les listes



```c
typedef struct Node
{
    Node* pNext;
    Node* pPrevious;

    int iValue;

} Node;

typedef struct List
{
    Node* pFirst;

    int iCount;
} List;

void Init( List* pList )
{
    //
}

void AddFirst( List* pList, int iValue )
{
    //
}

void AddLast( List* pList, int iValue )
{
    //
}

void AddBeforeNode( List* pList, Node* pNode, int iValue )
{
    //
}

void AddAfterNode( List* pList, Node* pNode, int iValue )
{
    //
}

void Insert( List* pList, int iValue, int iIndex )
{
    //
}

void Remove( List* pList, int iIndex )
{
    //
}

void RemoveNode( List* pList, Node* pNode )
{
    //
}

Node* GetNode( List* pList, int iIndex )
{
    //
}

void Print( List* pList )
{
    //
}

void Destroy( List* pList )
{
    //
}
```



```c
int main()
{
    List oList;
    Init( &oList );

    AddLast( &oList, 1 );
    AddLast( &oList, 2 );
    AddLast( &oList, 3 );

    AddFirst( &oList, 0 );

    /*

    */

    Destroy( &oList );
}
```