COP 3503 Lab#2

Loops and Arrays

Print Special characters

	Description
\n	Linefeed(new line)
\t	Tab (to align elements)
\r	Carriage return
\b	Backspace
\\	Backslash
\’	Single quote
\”	Double quote

Print Special Characters

- Examples :

1) char c = '\n';

std::cout<<"line one" <<c<< "line two"<<c;

Output:

line one

line two

2) std::cout<<"tab\\1\ttab\\2";

Output:

tab\1   tab\2

Loops(1): For Loop

```
for (initial-action; condition; increase) {
    //loop body Statements(s);
}
```

- ➢ The initial-action and increase are optional, which can be
- 1) ***empty*** or 2) ***a list comma-separated statements***

```
for (int i=0, j=8; (i+j<10);  i+=2, j-=1) {   //do something here }
```

- ➢ When the condition is empty, it is implicitly true

Loops(2): While and Do-while

Syntax:

```
while (condition)
{
// Loop body Statement(s);
}
```

```
do
{
// Loop body Statement(s);
} while (condition);
```

Loops(3): Tips

- You may use "break;" or "continue;" inside loops:

  -**continue**: end current iteration and start with next one;

  -**break**: jump out to execute code after the loop.

- Use the most intuitive loop :

  -If number of repetitions known ***for***

  -If number of repetitions unknown ***while***

  -And if should be touched at least once (before testing the condition) ***do-while***

Loops(4): examples

```
#include <iostream>
int main(){
	int n; std::cin >> n; int k = 0;
	for (int i = 1; i <= n; i++){
		std::cout<<i<< "\t";
		if (i % 10 == 0){ //10 numbers per line
			std::cout << "\n";
		}// end if
	} // end for loop
	std::cout << "\n";
	return 0 ;
}
```

Arrays(1): Declaration

type name [elements];

Type: such as: int, float, char…

Name: identifier

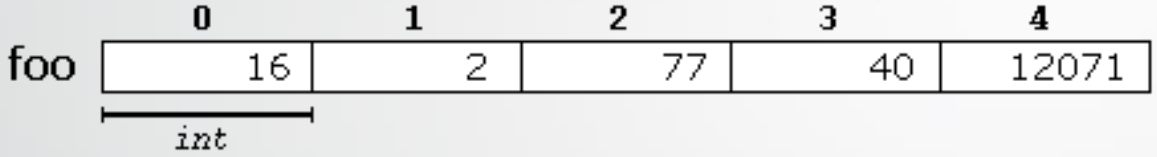
Elements: specifies the length of the array in terms of the number of elements.(must be a ***constant*** *expression*)

Example:

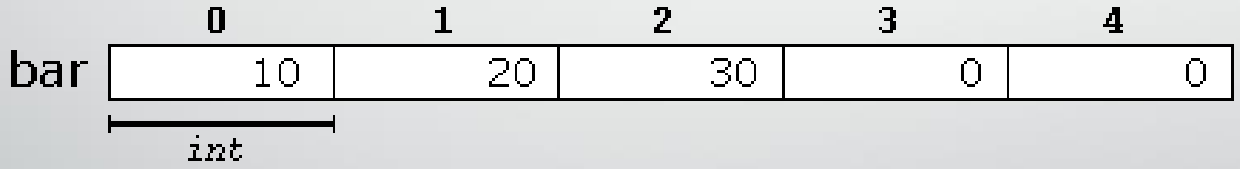
```
int foo [5];
const int size = 6;
char name [size];
```

Array(2):Initialization

```
int foo [5] = { 16, 2, 77, 40, 12071 };
```

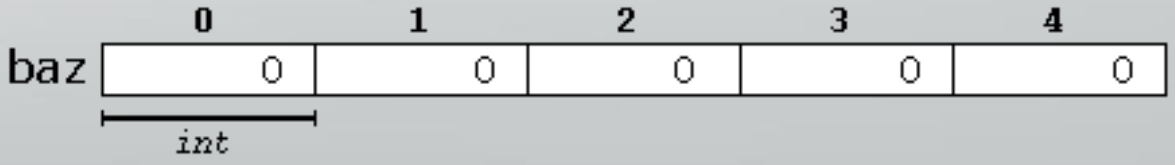



```
int bar [5] = { 10, 20, 30 };
```



So how about?

```
int baz[5]  = {};
```



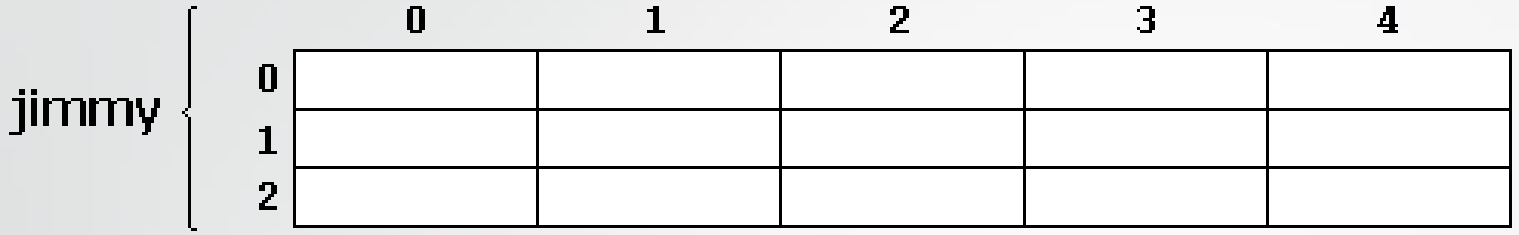
Array(3):Dynamic Array

- pointer = new type [**size**]

Dynamic Array don't need constant variable as size. Use **new** function to assign memory during runtime using any variable value as size.

```
int main (){
    int size; cin>>size;
    int * foo = new int [size]; //foo is a pointer to an array
    for( int i = 0; i < size; i++ )  foo[i] = 0;
    delete [ ] foo;
    return 0;
}
```

Multidimensional arrays




```
int jimmy [3][5];
```

Multidimensional arrays are just an abstraction for programmers, since the same results can be achieved with a simple array, by multiplying its indices.

```
int jimmy [3][5];  // is equivalent to
int jimmy [15];  // (3 * 5 = 15
```

Example

multidimensional array	pseudo-multidimensional array

#define WIDTH 5
#define HEIGHT 3
 	
int main () {
  int jimmy [HEIGHT][WIDTH];
  int n,m;
 	
  for (n=0; n<HEIGHT; n++)
  for (m=0; m<WIDTH; m++) {
  jimmy[n][m]=(n+1)*(m+1);
  }
}
 	
	#define WIDTH 5
	#define HEIGHT 3
	
	int main () {
	  int jimmy [HEIGHT * WIDTH];
	  int n,m;
	
	  for (n=0; n<HEIGHT; n++)
	  for (m=0; m<WIDTH; m++) {
	  jimmy[n*WIDTH+m]=(n+1)*(m+1);
	  }
	}

Exercise 1:

- Print out the two dimensional matrix we produced in last example as following.

output: 1 2 3 4 5;

2 4 6 8 10;

3 6 9 12 15;

Exercise 2

Write a program that asks the user to input the UFID and store each digits into an array. The program then :

1)compute and print how many digits are greater than the first digit and

2)give the sum of those digits less than or equal to first digit.

Example results:

input: 48632136

output: 8,6,6 are greater than the first digit 4.

Sum of other digits is 9.

Exercise 3

- Write a program that asks the user to input 10 integers of an array and an integer value V. Search if the value V exists in the array and then remove the first occurrence of V, shifting each following element left and adding a zero at the end of the array.
- The program need to print the final array.

input: 10 integers: 2 3 4 5 6 5 4 3 2 1

Search for: 4

output: 2 3 5 6 5 4 3 2 1 0

- Questions?