



Research Project 1: Programming Applications [1]

By using the C++ programming language, create a programming project to implement the following 5 different applications, in one project program. The project program first asks the user to enter a selection number as follows:

Please, select one of the following applications:

- [1] Select 1 to execute Calculator
- [2] Select 2 to execute Comparator
- [3] Select 3 to execute Summing System
- [4] Select 4 to find Maximum of m numbers
- [5] Select 5 to calculate sum of series

Please, Enter Your Selection:

Then, the project program start execution the respective application associated with the selected number. Finally, the program shows the results on the screen and asks the user whether terminate the project or run again using yes or no.

The 5 applications of this project are:

1. A simple **calculator** that simulates the 4 mathematical operations: addition, subtraction, division and multiplications of two input numbers.
2. A simple **comparator** that compares three different integer numbers (x, y and z) to find the minimum value.
3. A simple **summing** system that computes the sum and average of the even integer numbers from 1 to m.
4. A function called **maximum()** to find and return the maximum value of n integer numbers that input from the keyboard.
5. A function called **Sum()** to compute and return the sum of the series: $S = 1 + 1/4 + 1/9 + 1/16 + + 1/n^2$.



Research Project 2: Programming Applications [2]

By using the C++ programming language, create a programming project to implement the following 5 different applications, in one project program. The project program first asks the user to enter a selection number as follows:

Please, select one of the following applications:

- [1] Select 1 to execute Grading System
- [2] Select 2 to execute Comparator
- [3] Select 3 to execute Summing System
- [4] Select 4 to find minimum of n numbers
- [5] Select 5 to calculate Factorial of a number

Please, Enter Your Selection:

Then, the project program start execution the respective application associated with the selected number. Finally, the program shows the results on the screen and asks the user whether terminate the project or run again using yes or no.

The 5 applications of this project are:

- A simple **grading** system that computes the grades (**Excellent, Very Good, Good, Pass, Fail**) of n students in an exam based on their scores in the exam.
- A simple **comparator** that compares three different integer numbers (x, y and z) to find the largest value.
- A simple **summing** system that computes the sum and average of the numbers divisible by 5 from 1 to n.
- A function called **minimum()** to find and return the minimum value of n integer numbers that input from the keyboard.
- A function called **Fact()** to compute and return factorial of an input number n using **Recursion**.



Research Project 3: Programming Applications [3]

By using the C++ programming language, create a programming project to implement the following 5 different applications, in one project program. The project program first asks the user to enter a selection number as follows:

Please, select one of the following applications:

- [1] Select 1 to calculate Area
- [2] Select 2 to execute Comparator
- [3] Select 3 to execute Summing System
- [4] Select 4 to find minimum of n numbers
- [5] Select 5 to print pattern on the screen

Please, Enter Your Selection:

Then, the project program start execution the respective application associated with the selected number. Finally, the program shows the results on the screen and asks the user whether terminate the project or run again using yes or no.

The 5 applications of this project are:

1. A function called **Area()** to compute and return the area of a Circle or Square or Rectangle according to an input selector called sel.
2. A simple **comparator** that compares three different integer numbers (x, y and z) to find the largest value.
3. A simple **summing** system that computes the sum and average of n numbers that input from the keyboard.
4. A function called **minimum()** to compute and return the minimum value of n integer numbers that input from the keyboard.
5. A function called **Pattern()** to draw the following pattern on the Screen:

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*  
* * *  
* * * * *  
* * * * * * *
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Best Wishes



Research Project 4: Special Calculator

Name of the Research Point	Description
Special Calculator	<ul style="list-style-type: none">- Use what you have learned in C++ to write a console application that gives the user options to perform calculations.- The calculator should be able to specify the desired operation first then asks the user to enter the operands.- Mathematical operations are like but not limited to:<ul style="list-style-type: none">o Simple addition, subtraction, division, multiplication and remainder.o Factorialo Roots of a number (square, cube, and general that means you let the user to specify the root)o Powers of a number (square, cube and general which means that you let the user to specify the exponent)o Reciprocal of a numbero Logarithm problems with base 10 and the natural baseo Trigonometry problems (Sine 'sin', Cosine 'cos', Tangent 'tan', Secant 'sec', Cosecant 'csc', Cotangent 'cot')- An introductory statement should be printed to the user that shows what operations your calculator can perform. Then the user should be asked to enter their choice. "A hint: you can use the switch...case statement to code the user choices". After that, depending on the operation, the user should be asked to enter an operand or more. Lastly, the result is to be calculated then printed.- Use functions to code your operations and call them within the main function.- You may get benefit of the math.h library.



Research Project 5: Unit Converter

Name of the Research Point	Description
Unit Converter	<ul style="list-style-type: none">- Use what you have learned in C++ to write a console application that can be a unit converter.- Make an introductory statement that shows the user the kind of conversions that your tool can perform.- Units to be converted are like but not limited to:<ul style="list-style-type: none">o Lengtho Currencyo Timeo Volumeo Masso Temperatureo Areao Digital storageo Energyo Speedo etc.- An introductory statement should be printed to the user that shows what conversion your tool can perform. Then the user should be asked to enter their choice. "A hint: you can use the switch...case statement to code the user choices".- Use functions to code your conversions and call them within the main function.

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Best Wishes



Research Project 6: String Manipulation Tool

Name of the Research Point	Description
String Manipulation tool	<ul style="list-style-type: none">- Use what you have learned in C++ to write a console application that can manipulate strings.- Basic string manipulations are like but not limited to:<ul style="list-style-type: none">o Reading string sentences from keyboard (sentences that has spaces)o Displaying strings on the screeno Finding a substring from a stringo Modifying stringo Comparing stringso Accessing characters of a stringo String Concatenationo Extract or truncate the first few characters of a string,o Extract or truncate some characters at the end of the string,o Find out the length (number of characters) of a string,o Convert a string from lowercase to UPPERCASE or vice-versa,o Check if a character has been used in a string, and the frequency of ito Find out if a string contains a specific substring or wordo Finding out if the string is a palindrome or not (a palindrome is a string that can be read the same from right or left. Ex: madam, racecar, mum, dad)o etc.- An introductory statement should be printed to the user that shows what manipulations that your tool can perform. Then the user should be asked to enter their choice. "A hint: you can use the switch...case statement to code the user choices". After that, depending on the choice, the user should be asked to enter a string or more. Lastly, the result is to be printed.- Use functions to code your conversions and call them within the main function.



Research Project 7: Converting Marks into Grades

Name of the Research Point	Description
Converting marks into grades	<ul style="list-style-type: none">- Use what you have learned in C++ to write a console application that can store students' marks of a class and then convert them into grades (excellent 'E', very good 'V', good 'G', pass 'P', fail 'F').- Your data should be stored as an array of floating numbers.- You should use the following functions:<ul style="list-style-type: none">- A function for entering the data,- A function for converting the marks in the array into grades and store the results in an array of characters.- A function for printing the table of the conversion. The table should include three columns the index, the mark, and the grade.

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Best Wishes

تعليمات هامة جدا

يجب الالتزام بالتعليمات التالية عند عمل المشروع البحثي في مادة لغات الحاسب:

- يختار الطالب مشروع بحثي واحد فقط من المشاريع السابقة.
- يلتزم الطالب باستخدام نموذج عمل البحث (Research Template) المخصص لذلك عند كتابة البحث.
- في جزء **Abstract**: يكتب فيه ملخص البحث في سبعة أسطر تحتوي على ٦٠ إلى ٧٠ كلمة، ويكتب فيه الطالب ماذا يقدم هذا البحث طبقا للمشروع البحثي الذي تم اختياره.
- في جزء **Introduction**: يكتب المقدمة والهدف من المشروع في حدود من ١٥٠ إلى ٢٠٠ كلمة، ويكتب فيه الطالب مقدمة عامة عن برمجيات الحاسب (Computer Software) وأنواعها، ولغات الحاسب (Computer Languages) وأنواعها، والفرق بين (Compiler) و (Assembler) وكذلك يكتب فيه الطالب الهدف من المشروع البحثي طبقا للمشروع البحثي الذي تم اختياره.
- في جزء **Research Project Contents**: يكتب فيه تفاصيل المشروع البحثي من حيث الشرح والتوضيح والاجابة و.....إلخ، حيث يكتب الطالب في هذا الجزء تفاصيل المشروع البحثي والحلول المقدمة من الطالب للمشروع البحثي الذي قام الطالب باختياره من النماذج المطروحة له.
- في جزء **References**: يكتب فيها الطالب أسماء المراجع المرتبطة بالمشروع البحثي الذي تم اختياره بشرط لا تقل عن ٥ مراجع وان يكون معظمها من بنك المعرفة المصري.