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# PPS8

## Q1

### Aim:

Simulate the MATH calculator for the following operators (+, *, $) by using C functions.

'+' Operator does the following: Accept 2 integers as input and perform the summation of the given two numbers and return the sum as answer.

'*' Operator: Accepts 2 integers as input and multiply the given two numbers and return the product as answer.

'$' Operator: Accept an integer as input and return the reverse of the given number.

### Procedure:

### Input:

Operator
Operands

### Output:

Addition, multiplication or reverse of the number

### Algorithm:

Step 1: Declare 'add', 'multiplication' and 'reverse' function with return type 'int' and argument 'void'

### Main Function

Step 1: Read operator, op
Step 2: Use switch case for operator
    Case 1 ('+'): Call function 'add' and print its return value
    Case 2 ('*'): Call function 'multiplication' and print its return value
    Case 3 ('$'): Call function 'reverse' and print its return value
    Default: Print error message for invalid input

### Add Function

Step 1: Declare integer variables 'a', 'b' and 'sum'
Step 2: Read 'a' and 'b'
Step 3: sum = a + b
Step 4: return sum

### Multiply Function

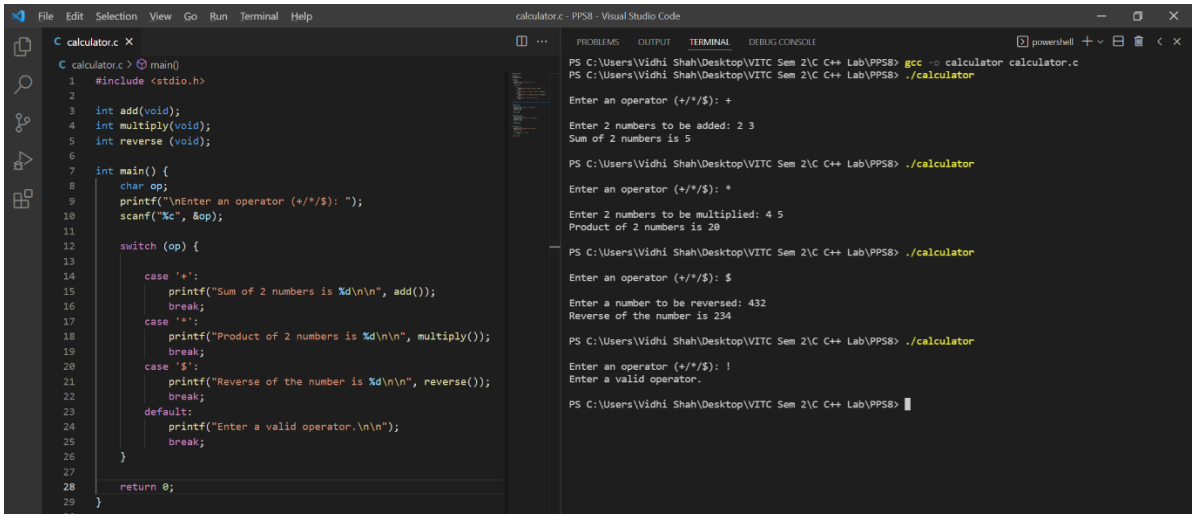
Step 1: Declare integer variables 'a', 'b' and 'prod'
Step 2: Read 'a' and 'b'

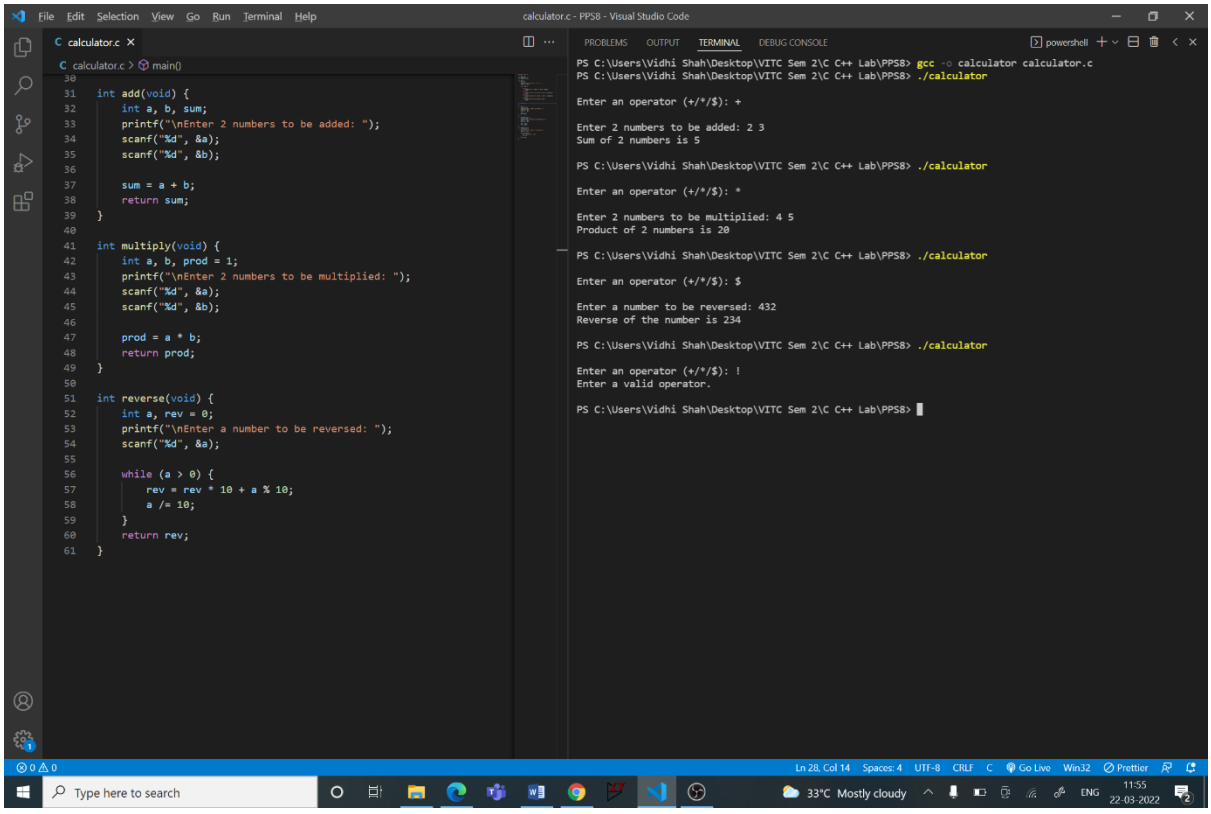
Step 3: prod = a * b
Step 4: return prod

## Reverse Function

Step 1: Declare integer variable ‘a’ and ‘rev’
Step 2: Read ‘a’
Step 3: While n > 0
rev = (rev * 10) + (a % 10)
a = a / 10
Step 4: return rev

# Code:



## Q2

## Aim:

Given an array, write a function to reverse the first and second half of an array keeping its center element unchanged if the array elements are odd.

## Procedure:

### Input:

Number of elements in the array, ‘n’
‘Array of length ’n’

### Output:

Array with 2 halves reversed separately

### Algorithm:

Step 1: Declare ‘reverse’ function with return type ‘void’ and argument ‘void’

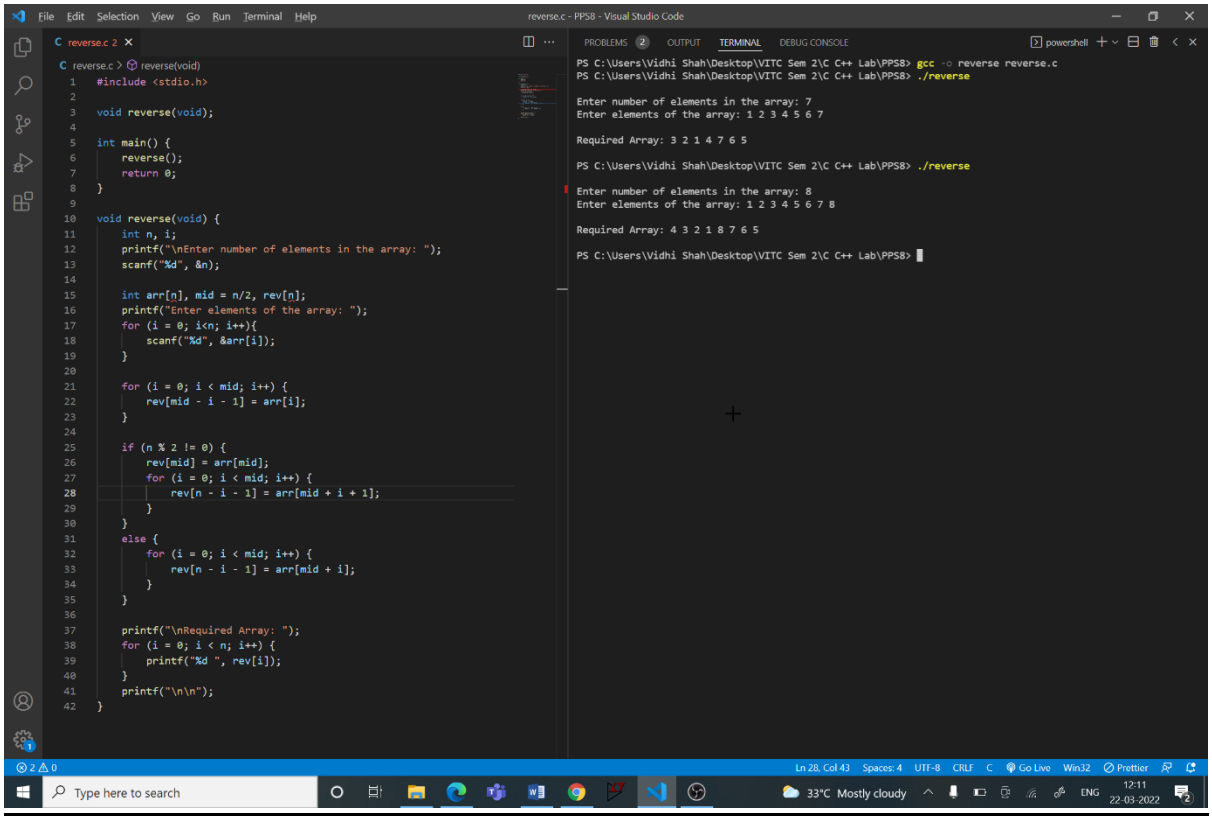
### Main Function

Step 1: Call function ‘reverse’

### Reverse Function

Step 1: Initialise integer variable ‘n’ and ‘i’
Step 2: Read ‘n’
Step 3: Initialise 2 integer arrays of size n, ‘arr’ and ‘rev’. Let mid = n/2
Step 4: Read elements into the array
Step 5: For ‘i’ from 0 to mid (excluding mid)
    Step A: rev[mid - i - 1] = arr[i]
Step 6: If n is odd
    Step A: rev[mid] = arr[mid]
    Step B: For ‘i’ from 0 to mid (excluding mid)
        Step B1: rev[n - i - 1] = arr[mid + i + 1]
Step 6: If n is even
    Step A: For ‘i’ from 0 to mid (excluding mid)
        Step A1: rev[n - i - 1] = arr[mid + i]
Step 7: Display the rev array

# Code:


File Edit Selection View Go Run Terminal Help
reverse.c - PPS8 - Visual Studio Code
reverse.c 2
reverse.c > reverse(void)
#include <stdio.h>
void reverse(void);
int main() {
reverse();
return 0;
}
void reverse(void) {
int n, i;
printf("\nEnter number of elements in the array: ");
scanf("%d", &n);
int arr[n], mid = n/2, rev[n];
printf("Enter elements of the array: ");
for (i = 0; i<n; i++){
scanf("%d", &arr[i]);
}
for (i = 0; i < mid; i++) {
rev[mid - i - 1] = arr[i];
}
if (n % 2 != 0) {
rev[mid] = arr[mid];
for (i = 0; i < mid; i++) {
rev[n - i - 1] = arr[mid + i + 1];
}
}
else {
for (i = 0; i < mid; i++) {
rev[n - i - 1] = arr[mid + i];
}
}
printf("\nRequired Array: ");
for (i = 0; i < n; i++) {
printf("%d ", rev[i]);
}
printf("\n\n");
}
PROBLEMS 2 OUTPUT TERMINAL DEBUG CONSOLE
powershell
PS C:\Users\Vidhi Shah\Desktop\VITC Sem 2\C C++ Lab\PPS8> gcc -o reverse reverse.c
PS C:\Users\Vidhi Shah\Desktop\VITC Sem 2\C C++ Lab\PPS8> ./reverse
Enter number of elements in the array: 7
Enter elements of the array: 1 2 3 4 5 6 7
Required Array: 3 2 1 4 7 6 5
PS C:\Users\Vidhi Shah\Desktop\VITC Sem 2\C C++ Lab\PPS8> ./reverse
Enter number of elements in the array: 8
Enter elements of the array: 1 2 3 4 5 6 7 8
Required Array: 4 3 2 1 8 7 6 5
PS C:\Users\Vidhi Shah\Desktop\VITC Sem 2\C C++ Lab\PPS8>
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## Q3

## Aim:

Given an array, write a function to insert a number ‘x’ at index 0.

## Procedure:

### Input:

Number of elements in the array, ‘n’
Array of length ‘n’
A number, ‘x’

### Output:

Array with ‘x’ at $0^{th}$ index

### Algorithm:

Step 1: Declare ‘insert0’ function with return type ‘void’ and argument ‘void’

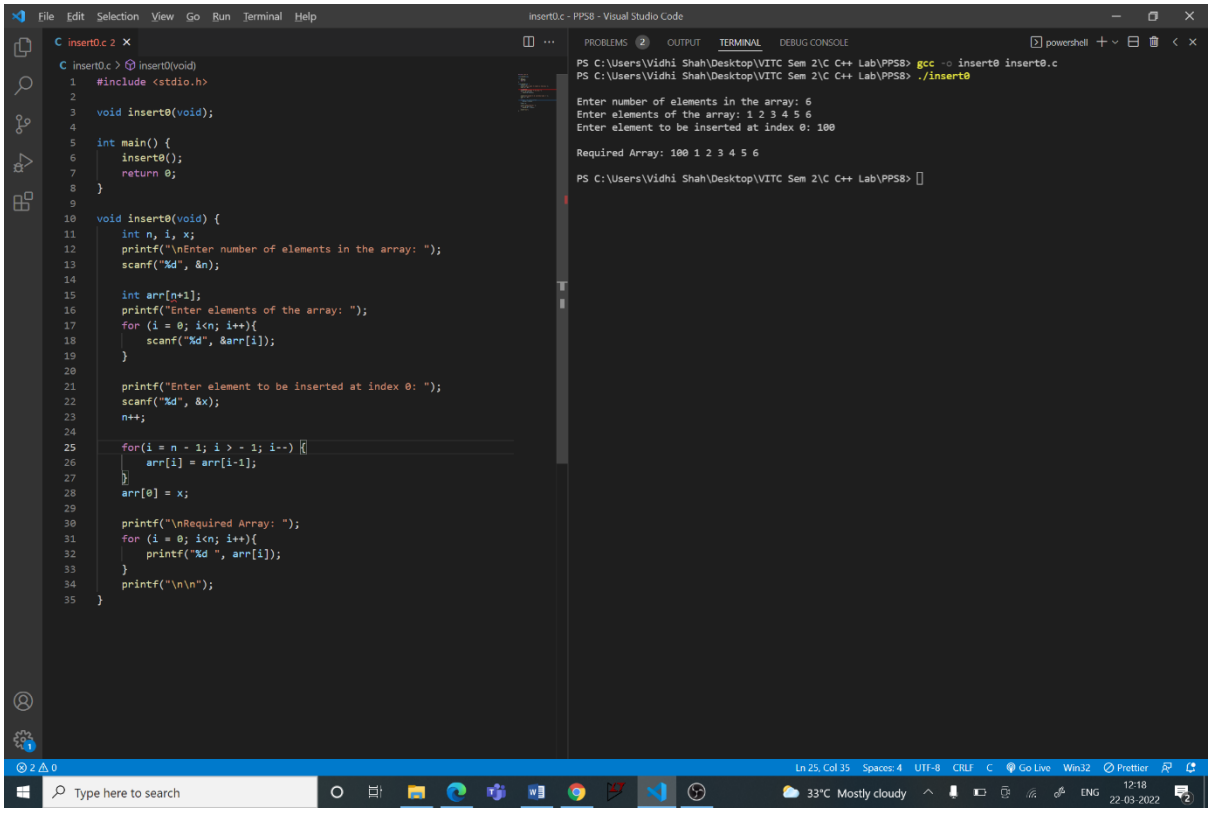
### Main Function

Step 1: Call function ‘insert0’

### Insert0 Function

Step 1: Initialise integer variable ‘n’, ‘i’ and ‘x’
Step 2: Read ‘n’
Step 3: Initialise an integer array of size n + 1
Step 4: Read elements into the array
Step 5: Read ‘x’
Step 6: Increment n by 1
Step 7: For ‘i’ from n - 1 to -1 (excluding -1)
    Step A: arr[i] = arr[i-1]
Step 8: arr[0] = x
Step 9: Display the array

# Code:


File Edit Selection View Go Run Terminal Help
insert0.c - PPS8 - Visual Studio Code
insert0.c 2
insert0.c > insert0(void)
#include <stdio.h>
void insert0(void);
int main() {
insert0();
return 0;
}
void insert0(void) {
int n, i, x;
printf("\nEnter number of elements in the array: ");
scanf("%d", &n);
int arr[n+1];
printf("Enter elements of the array: ");
for (i = 0; i<n; i++){
scanf("%d", &arr[i]);
}
printf("Enter element to be inserted at index 0: ");
scanf("%d", &x);
n++;
for(i = n - 1; i > - 1; i--) {
arr[i] = arr[i-1];
}
arr[0] = x;
printf("\nRequired Array: ");
for (i = 0; i<n; i++){
printf("%d ", arr[i]);
}
printf("\n\n");
}
PROBLEMS 2 OUTPUT TERMINAL DEBUG CONSOLE
powershell
PS C:\Users\Vidhi Shah\Desktop\VITC Sem 2\C C++ Lab\PPS8> gcc -o insert0 insert0.c
PS C:\Users\Vidhi Shah\Desktop\VITC Sem 2\C C++ Lab\PPS8> ./insert0
Enter number of elements in the array: 6
Enter elements of the array: 1 2 3 4 5 6
Enter element to be inserted at index 0: 100
Required Array: 100 1 2 3 4 5 6
PS C:\Users\Vidhi Shah\Desktop\VITC Sem 2\C C++ Lab\PPS8>
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## Q4

## Aim:

Given an array and a new position ‘p’, write a function to insert a number ‘x’ at position ‘p’

## Procedure:

### Input:

Number of elements in the array, ‘n’
Array of length ‘n’
A position, ‘p’
A number, ‘x’

### Output:

Array with ‘x’ at $p^{th}$ index

### Algorithm:

Step 1: Declare ‘insert’ function with return type ‘void’ and argument ‘void’

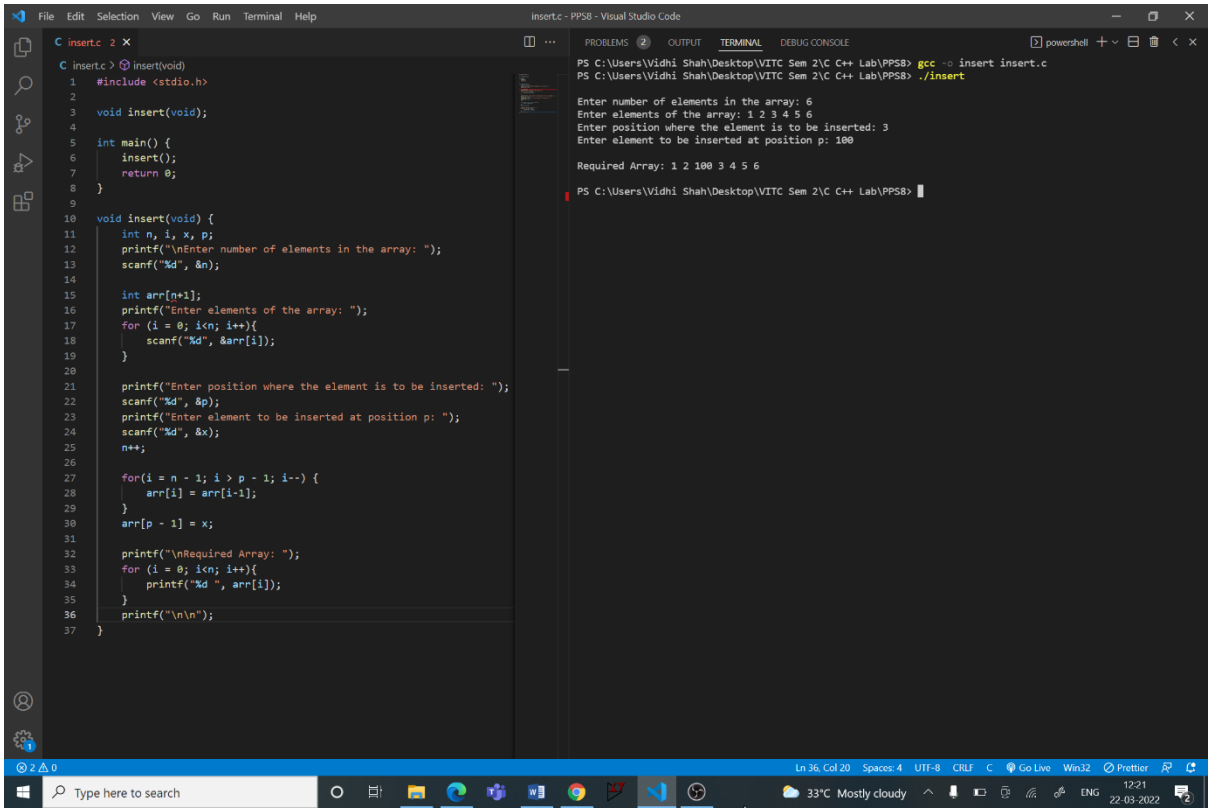
### Main Function

Step 1: Call function ‘insert’

### Insert Function

Step 1: Initialise integer variable ‘n’, ‘i’, ‘p’ and ‘x’
Step 2: Read ‘n’
Step 3: Initialise an integer array of size n + 1
Step 4: Read elements into the array
Step 5: Read ‘p’ and ‘x’
Step 6: Increment n by 1
Step 7: For ‘i’ from n - 1 to p - 1 (excluding p - 1)
    Step A: arr[i] = arr[i-1]
Step 8: arr[p - 1] = x
Step 9: Display the array

# Code:


File Edit Selection View Go Run Terminal Help
insert.c - PPS8 - Visual Studio Code
insert.c 2
insert.c > insert(void)
#include <stdio.h>
void insert(void);
int main() {
insert();
return 0;
}
void insert(void) {
int n, i, x, p;
printf("\nEnter number of elements in the array: ");
scanf("%d", &n);
int arr[n+1];
printf("Enter elements of the array: ");
for (i = 0; i<n; i++){
scanf("%d", &arr[i]);
}
printf("Enter position where the element is to be inserted: ");
scanf("%d", &p);
printf("Enter element to be inserted at position p: ");
scanf("%d", &x);
n++;
for(i = n - 1; i > p - 1; i--) {
arr[i] = arr[i-1];
}
arr[p - 1] = x;
printf("\nRequired Array: ");
for (i = 0; i<n; i++){
printf("%d ", arr[i]);
}
printf("\n\n");
}
PROBLEMS 2 OUTPUT TERMINAL DEBUG CONSOLE
powershell
PS C:\Users\Vidhi Shah\Desktop\VITC Sem 2\C C++ Lab\PPS8> gcc -o insert insert.c
PS C:\Users\Vidhi Shah\Desktop\VITC Sem 2\C C++ Lab\PPS8> ./insert
Enter number of elements in the array: 6
Enter elements of the array: 1 2 3 4 5 6
Enter position where the element is to be inserted: 3
Enter element to be inserted at position p: 100
Required Array: 1 2 100 3 4 5 6
PS C:\Users\Vidhi Shah\Desktop\VITC Sem 2\C C++ Lab\PPS8>
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