|  |  |
| --- | --- |
| Program No: 01 | Date: 23/07/2025 |
| Program Title : Write programs to demonstrate the use of storage classes (local variable, global variable, static variable, register variable) in C. | |
| /\*Program 1 USE DIFFERENT STORAGE CLASSES (LOCAL,GLOBAL,STATIC,REGISTER)  @ALBIN MAMMEN MATHEW  Roll No: 08  Date: 23/07/2025  \*/  #include<stdio.h>  int a = 10; //intialising global variable  void disp(){  int i = 3; //intialising local variable  printf("this is a local variable : %d \n",i);  }  int main(){  static int c; //intialising static varible  register int p = 4; //intialising register variable  printf("this is a static variable : %d \n",c);  printf("this is a global variable : %d \n",a);  printf("this is a register variable : %d \n",p);  disp();  return 0;  } | |
| Output | |

|  |  |
| --- | --- |
| Program No: 02 | Date: 23/07/2025 |
| Program Title : Use a menu-driven program to insert, search, delete and sort elements in an array using functions (use global variables). | |
| /\*PROGRAM-2 A MENU FOR ARRAY OPERATIONS(INSERT,DELETE,DISPLAY,SEARCH,SORT) USING GLOBAL VARIABLE  @ALBIN MAMMEN MATHEW  Roll No: 08  Date: 23/07/2025  \*/  #include<stdio.h>  int stack[5]; //declaring stack  int top = -1; //declaring variable positionof top element  int insert(int e) { //Function to insert element into stack  if (top + 1 == 5) {  printf("Error: Stack is Full");  }  else {  stack[++top] = e;  }  return top;  }  int erase() { //function to delete top element  if (top == -1){  printf("Error: Stack is empty");  }  else {  printf("\n %d",stack[top--]);  }  return top;  }  void search(int b, int a[5], int top){ //function to search elements  int isfound = 0, i;  for (i = 0; i <= top; i++) {  if (b == a[i]) {  isfound = 1;  printf("Element found at [%d] position. \n", i);  }  }  if (isfound == 0)  printf("element not found");  }    void display() { //function to display the elements in stack  if (top == -1)  printf("Empty Stack");  else {  int i;  for (i = 0; i <= top; i++){  printf("%d \t",stack[i]);  }  printf("\n");  }  }  void sort(){ //function to sort the stack  int i, j, temp;  for (i = 0; i < 5; i++) {  for (j = 0; j < 5; j++) {  if(stack[i] < stack[j]) {  temp = stack[i];  stack[i] = stack[j];  stack[j] = temp;  }  }  }  }  int menu() { //function for menu  int ch;  printf("\n INSERT-1 \n DELETE-2 \n DISPLAY-3 \n SEARCH-4 \n SORT-5 \n EXIT -6 \n Enter your choice: ");  scanf("%d", &ch);  return ch;  }  void processStack() { //working of menu  int ch, b;  for (ch = menu(); ch != 6; ch = menu()) {  switch(ch){  case 1: //insert  printf("Enter the value to insert: ");  scanf("%d", &ch);  insert(ch);  break;  case 2: //delete  erase();  break;  case 3: //display  display();  break;  case 4: //search  printf("Enter the value to search: ");  scanf("%d",&b);  search(b, stack, top);  break;  case 5: // sort  sort();  break;  default: //any other options  printf("Error: Wrong Choice");  break;  }  }  }  int main() {  processStack();  return 0;  } | |
| Output | |
| Program No: 03 | Date: 23/07/2025 |
| Program Title : Use a menu-driven program to insert, search, delete and sort elements in an array using functions (use only local variables). | |
| /\*PROGRAM-3 A MENU FOR ARRAY OPERATIONS(INSERT,DELETE,DISPLAY,SEARCH,SORT) USING LOCAL VARIABLE  @ALBIN MAMMEN MATHEW  Roll No: 08  Date: 23/07/2025  \*/  #include <stdio.h>  int insert(int a[5], int pos, int e) { //function to insert an element  if (pos + 1 == 5) {  printf("Error: Array is Full\n");  }  else {  a[++pos] = e;  }  return pos;  }  int erase(int a[5], int pos) { //function to delete top element  if (pos == -1) {  printf("Error: Array is Empty\n");  }  else {  printf("Deleted element: %d\n", a[pos--]);  }  return pos;  }  void display(int a[5], int pos){ //function to display entire array  if (pos == -1) {  printf("Error: Array is Empty\n");  }  else {  int i;  for (i = 0; i <= pos; i++) {  printf("%d\t", a[i]);  }  printf("\n");  }  }  void search(int b, int a[5], int pos){ //function to search for an element and display its index  int isfound = 0, i;  for (i = 0; i <= pos; i++) {  if(b==a[i]) {  isfound=1;  printf("Element found at [%d] position. \n",i);  }  }  if (isfound == 0)  printf("element not found");  }  void sort(int a[5]){ //function to sort the stack  int i, j, temp;  for (i = 0; i < 5; i++) {  for (j = 0; j < 5; j++) {  if(a[i] < a[j]) {  temp = a[i];  a[i] = a[j];  a[j] = temp;  }  }  }  }  int menu() { //function to create menu interface  int ch;  printf("\nInsert - 1\nDelete - 2\nDisplay - 3\nSearch - 4\nSort - 5\nExit - 6\nEnter your choice: ");  scanf("%d", &ch);  return ch;  }  void processArray() { //working of menu  int a[5], pos = -1, b;  int ch, value;  for (ch = menu(); ch != 6; ch = menu()) {  switch (ch) {  case 1:  printf("Enter value to insert: ");  scanf("%d", &value);  pos = insert(a, pos, value);  break;  case 2:  pos = erase(a, pos);  break;  case 3:  display(a, pos);  break;  case 4:  printf("Enter the element to search: ");  scanf("%d",&b);  search(b,a,pos);  break;  case 5:  sort(a);  break;  default:  printf("Error: Wrong Choice.\n");  }  }  }  int main() {  processArray();  return 0;  } | |
| Output | |

|  |  |
| --- | --- |
| Program No: 04 | Date: 23/07/2025 |
| Program Title : Search for all the occurrences of an element in an integer array (positions). | |
| /\*PROGRAM-4 ARRAY SEARCH  @ALBIN MAMMEN MATHEW  Roll No: 08  Date: 23/07/2025  \*/  #include<stdio.h>  void search(int b,int a[5]){ //function for search function  int isfound = 0, i;  for (i = 0; i < 5; i++){  if (b == a[i]) {  isfound = 1;  printf("Element found at [%d] position. \n",i); //displays index  }  }  if (isfound = 0)  printf("element not found");  }  int main() {  int a[5], ch, i;  for (i = 0; i < 5; i++) {  printf("Enter the [%d] element : ",i);  scanf("%d",&a[i]);  }  for (i = 0; i < 5; i++) {  printf("%d \t",a[i]);  }  printf("\n");  printf("Enter the element to search: ");  scanf("%d", &ch);  search(ch,a);  return 0;  } | |
| Output | |

|  |  |
| --- | --- |
| Program No: 05 | Date: 23/07/2025 |
| Program Title : Sort the array elements in ascending order (minimum three functions: read, disp and sort). | |
| /\*PROGRAM-5 SORT ARRAY IN ASC WITH ALTEAST 3 FUNCTIONS - READ DISP SORT  @ALBIN MAMMEN MATHEW  Roll No: 08  Date: 23/07/2025  \*/  #include<stdio.h>  void read(int n,int arr[n]){ //function to insert elements in array  int i;  for (i = 0; i < n; i++) {  printf("Enter the value for %d :",i);  scanf("%d", &arr[i]);  }  }  void disp(int n,int arr[n]) { //function to display all elemenyts in array  int i;  for (i = 0; i < n; i++) {  printf("%d\t", arr[i]);  }  }  void sort(int n,int arr[n]) { //function for sorting the elements in array in ascending order  int i, j, temp;  for (i = 0; i < n; i++) {  for (j = 0; j < n; j++) {  if (arr[i] < arr[j]) {  temp = arr[i];  arr[i] = arr[j];  arr[j] = temp;  }  }  }  }  int menu() { //funtion for menu interface  int ch;  printf("\nREAD-1\nSORT-2\nDISPLAY-3\nEXIT-4\nENTER YOUR CHOICE: ");  scanf("%d", &ch);  return ch;  }  void processArray(int n,int arr[n]) { //working of menu  int ch;  for (ch = menu(); ch != 4; ch = menu()) {  switch(ch) {  case 1:  read(n,arr);  break;  case 2:  sort(n,arr);  break;  case 3:  disp(n,arr);  break;  default:  printf("Errror: Wrong Choice\n");  break;  }  }  }  int main() {  int n;  printf("Enter limit of Array:");  scanf("%d",&n);  int arr[n];  processArray(n,arr);  return 0;  } | |
| Output | |

|  |  |
| --- | --- |
| Program No: 06 | Date: 23/07/2025 |
| Program Title : Display the array elements in the same order using a recursive function. | |
| /\*PROGRAM-6 DISPLAY ARRAY USING RECURSIVE FUNCTION  @ALBIN MAMMEN MATHEW  Roll No: 08  Date: 25/07/2025  \*/  #include<stdio.h>  int j = 0, arr[10];  void display() { //display function as a recursive function  if (j < 10) {  printf("%d\t",arr[j]);  j++;  display();  }  If (j == 10)  j = 0;  }  int main() {  int i=0;  for (i = 0; i < 10; i++) {  printf("Enter the value for %d:", i);  scanf("%d", &arr[i]);  }  display();  return 0;  } | |
| Output | |
| Program No: 07 | Date: 23/07/2025 |
| Program Title : Display array elements in reverse order using a recursive function. | |
| /\*PROGRAM-7 DISPLAY ARRAY INN REVERSE USING RECURSIVE FUNCTION  @ALBIN MAMMEN MATHEW  Roll No: 08  Date: 26/07/2025  \*/  #include<stdio.h>  int j = 10, arr[10];  void display() { //function to display elements in reverse using recursive function  if (j > 0) {  j--;  printf("%d\t",arr[j]);  display();  if (j == 0)  j = 10;  }  }  int main() {  int i = 0;  for (i = 0; i < 10; i++) {  printf("Enter the value for %d:", i);  scanf("%d", &arr[i]);  }  display();  return 0;  } | |
| Output | |
| Program No: 08 | Date: 23/07/2025 |
| Program Title : Write a program to Perform the addition of two matrix and Subtraction of one matrix from another. | |
| /\*PROGRAM-8 MATRIX ADDITION AND SUBTRACTION  @ALBIN MAMMEN MATHEW  Roll No: 08  Date: 25/07/2025  \*/  #include<stdio.h>  int a[10][10], b[10][10], m, n;  void insert(int e[10][10],int m, int n){ //function to insert values into the matrix  int i, j;  for (i = 0; i < m; i++){  for (j = 0; j < n; j++){  printf("Enter the value of [%d] [%d] \: ", i, j);  scanf("%d", &e[i][j]);  }  }  }  void print(int p[10][10],int m, int n){ //function to print a matrix  int i, j;  for (i = 0; i < m; i++) {  for (j = 0; j < n; j++) {  printf("%d\t",p[i][j]);  }  printf("\n");  }  }  void add() { //funtion to add two matrices  int sum[10][10], i, j;  for (i = 0; i < m; i++) {  for (j = 0; j < n; j++) {  sum[i][j]=a[i][j]+b[i][j];  }  }  print(sum,m,n);  }  void diffn() { //function to subtract a matrix from another  int dif[10][10], i, j;  for (i = 0; i < m; i++) {  for (j = 0; j < n; j++) {  dif[i][j]=a[i][j]-b[i][j];  }  }  print(dif,m,n);  }  int main() {  printf("Enter the dimensions of the Matrix: ");  scanf("%d%d",&m,&n);  printf("Enter the First matrix :\n");  insert(a,m,n);  printf("Enter the Second matrix : \n");  insert(b,m,n);  printf("The first matrix is : \n");  print(a,m,n);  printf("The Second matrix is : \n");  print(b,m,n);  printf("The sum of matrices is : \n");  add(m,n);  printf("The difference of matrices is : \n");  diffn(m,n);  return 0;  } | |
| Output | |

|  |  |
| --- | --- |
| Program No: 09 | Date: 23/07/2025 |
| Program Title : Write a program to perform multiplication of two matrix. | |
| /\*PROGRAM-9 MATRIX MULTIPLICATION  @ALBIN MAMMEN MATHEW  Roll No: 08  Date: 25/07/2025  \*/  #include<stdio.h>  int a[10][10],b[10][10], m, n, p;  void insert(int e[10][10], int m, int n) { //function to insert values in the matrix  int i, j;  for (i = 0; i < m; i++) {  for(j=0;j<n;j++){  printf("Enter the value of [%d] [%d]: ", i, j);  scanf("%d",&e[i][j]);  }  }  }  void print(int p[10][10], int m, int n) { //funtion to display the matrix  int i, j;  for (i = 0; i < m; i++) {  for (j = 0; j < n; j++) {  printf("%d\t",p[i][j]);  }  printf("\n");  }  }  void multi() { //function to multipy two matrices  int prod[10][10], i, j, k;  for ( i = 0; i < m; i++) { //declaring intial value of elements of product to be zero  for (j = 0; j < p; j++) {  prod[i][j]=0;  }  }  for (i = 0; i < m; i++) {  for (j = 0; j < p; j++) {  for (k = 0; k < n; k++) {  prod[i][j] += a[i][k] \* b[k][j];  }  }  }  print(prod,m,p);  }  int main() {  printf("Enter the dimensions of first Matrix: ");  scanf("%d%d",&m,&n);  printf("Enter the First matrix :\n");  insert(a,m,n);  printf("Enter the number of columns for the Second Matrix: ");  scanf("%d", &p);  printf("Enter the Second matrix : \n");  insert(b,n,p);  printf("The first matrix is : \n");  print(a,m,n);  printf("The Second matrix is : \n");  print(b,n,p);  printf("The product of matrices is : \n");  multi();  return 0;  } | |
| Output | |

|  |  |
| --- | --- |
| Program No: 10 | Date: 23/07/2025 |
| Program Title : Write a program to find the transpose of a matrix. | |
| /\*PROGRAM-10 MATRIX TRANSPOSE  @ALBIN MAMMEN MATHEW  Roll No: 08  Date: 25/07/2025  \*/  #include<stdio.h>  int a[10][10], t[10][10];  void print(int e[10][10], int m, int n) { //function to print the matrix.  int i, j;  for (i = 0; i < m; i++) {  for (j = 0; j < n; j++) {  printf("%d\t", e[i][j]);  }  printf("\n");  }  }  void transpose(int m, int n) { //function to find transpose of matrix  int i,j;  for (i = 0; i < m; i++) {  for(j = 0; j < n; j++) {  t[j][i] = a[i][j];  }  }  printf("The Transpose of the matrix is : \n");  print(t,n,m);  }  int main() {  int m,n;  printf("Enter the dimensions of the Matrix:");  scanf("%d%d", &m, &n);  int i, j;  for (i = 0; i < m; i++) {  for (j = 0; j < n; j++) {  printf("Enter the value of [%d] [%d]: ", i, j);  scanf("%d",&a[i][j]);  }  }  printf("The matrix is : \n");  print(a,m,n);  transpose(m,n);  return 0;  } | |
| Output | |

|  |  |
| --- | --- |
| Program No: 11 | Date: 23/07/2025 |
| Program Title : Write a program to find the Determinant of a matrix (2x2 and 3x3). | |
| /\* PROGRAM-11 DETERMINANT OF A MATRIX  @ALBIN MAMMEN MATHEW  Roll No: 08  Date: 26/07/2025  \*/  #include <stdio.h>  int main() {  int size, a[3][3], i, j;  float det;  printf("Enter the size of the square matrix (2 or 3): ");  scanf("%d",&size);  if (size != 2 && size != 3) {  printf("Only 2x2 and 3x3 matrices are supported.\n");  return 1;  }  printf("Enter the elements of the matrix:\n");  for (i = 0; i < size; i++) {  for (j = 0; j < size; j++) {  printf("a[%d][%d]: ", i, j);  scanf("%d", &a[i][j]);  }  }  printf("The matrix is:\n");  for (i = 0;I < size; i++) {  for (j = 0; j < size; j++) {  printf("%d\t", a[i][j]);  }  printf("\n");  }  if (size == 2) {  det=a[0][0] \* a[1][1] - a[0][1] \* a[1][0]; // For 2x2: |A| = ad - bc  } else if (size==3) {  det = a[0][0] \* (a[1][1] \* a[2][2] - a[1][2] \* a[2][1]) //expansion of formula - a[0][1] \* (a[1][0] \* a[2][2] - a[1][2] \* a[2][0])  + a[0][2] \* (a[1][0] \* a[2][1] - a[1][1] \* a[2][0]);  }  printf("Determinant of the matrix = %.2f\n", det);  return 0;  } | |
| Output | |
| Program No: 12 | Date: 23/07/2025 |
| Program Title : Implement stack operations using arrays. | |
| /\*PROGRAM-12 STACK OPERATIONS USING ARRAY  @ALBIN MAMMEN MATHEW  Roll No: 08  Date: 26/07/2025  \*/  #include <stdio.h>  int push(int stack[5], int top, int e) { //function to push elements onto stack  if (top + 1 == 5) {  printf("Error: Stack is Full\n");  } else {  stack[++top] = e;  printf("Pushed\n");  }  return top;  }  int pop(int stack[5], int top){ //function to pop the top element from stack  if (top == -1){  printf("Error: Stack is Empty\n");  } else {  printf("Popped element: %d\n", stack[top--]);  }  return top;  }  void peek(int stack[5], int top) { //function to peek the top element in stack  if (top == -1) {  printf("Stack is Empty\n");  }else{  printf("Top element: %d \n",stack[top]);  }  }  int menu() { //function for menu interface  int ch;  printf("\nPush - 1\nPop - 2\nPeek - 3\nExit - 4\nEnter your choice: ");  scanf("%d", &ch);  return ch;  }  void processStack() { //working of menu  int stack[5], top = -1;  int ch, value;  for (ch = menu(); ch != 4; ch = menu()) {  switch (ch) {  case 1:  printf("Enter value to insert: ");  scanf("%d", &value);  top = push(stack, top, value);  break;  case 2:  top = pop(stack, top);  break;  case 3:  peek(stack, top);  break;  default:  printf("Error: Wrong Choice.\n");  }  }  }  int main() {  processStack();  return 0;  } | |
| Output | |
| Program No: 13 | Date: 23/07/2025 |
| Program Title : Read a String and Just print it in the reverse order. | |
| /\* PROGRAM-13 STRING REVERSAL  @ALBIN MAMMEN MATHEW  Roll No: 08  Date: 27/07/2025  \*/  #include<stdio.h>  void str\_rev(char a[20]){ //program to reverse a string  int i=0;  while (a[i] != '\0') {  i++;  }  for ( ; i >= 0; i--) {  printf("%c", a[i]);  }  }  int main() {  char a[20];  printf("Enter a String: ");  gets(a);  str\_rev(a);  return 0;  } | |
| Output | |

|  |  |
| --- | --- |
| Program No: 14 | Date: 23/07/2025 |
| Program Title : Read a String and Reverse the string in the same array itself. | |
| /\* PROGRAM-14 STRING REVERSAL IN THE SAME ARRRAY  @ALBIN MAMMEN MATHEW  Roll No: 08  Date: 27/07/2025  \*/  #include <stdio.h>  #include <string.h>  void reverse(char str[20]) { //function to reverse the string  int i = 0, j;  char temp;  j = strlen(str) - 1;  while (i < j) { //swaping end characters  temp = str[i];  str[i] = str[j];  str[j] = temp;  i++;  j--;  }  }  int main() {  char str[20];  printf("Enter a string: ");  fgets(str, sizeof(str), stdin);  printf("String is %s",str);  reverse(str);  printf("Reversed string : %s\n", str);  return 0;  } | |
| Output | |
| Program No: 15 | Date: 23/07/2025 |
| Program Title : Read n Strings and display them in the ascending order. | |
| /\* PROGRAM-15 SORTING N STRINGS  @ALBIN MAMMEN MATHEW  Roll No: 08  Date: 28/07/2025  \*/  #include <stdio.h>  #include <string.h>  int main() {  int n, i, j;  char str[20][100], temp[100];  printf("Enter the number of strings: ");  scanf("%d", &n);  getchar(); // to consume the newline after scanf  for (i = 0; i < n; i++) {  printf("Enter string %d: ", i + 1);  fgets(str[i], sizeof(str[i]), stdin);  str[i][strcspn(str[i], "\n")] = '\0'; // remove newline  }  for (i = 0; i < n - 1; i++) { // Sort strings using bubble sort  for (j = i + 1; j < n; j++) {  if (strcmp(str[i], str[j]) > 0) {  strcpy(temp, str[i]);  strcpy(str[i], str[j]);  strcpy(str[j], temp);  }  }  }  printf("\nStrings in ascending order:\n");  for (i = 0; i < n; i++) {  printf("%s\n", str[i]);  }  return 0;  } | |
| Output | |

|  |  |
| --- | --- |
| Program No: 16 | Date: 23/07/2025 |
| Program Title : Reverse a string using Stack. | |
| /\* PROGRAM-16 STRING REVERSAL USING STACK  @ALBIN MAMMEN MATHEW  Roll No: 08  Date: 28/07/2025  \*/  #include <stdio.h>  char stack[100];  int top=-1;  void push(char e) { //function to push elements onto stack  if (top + 1 == 100) {  printf("Error: Stack is Full\n");  }  else {  stack[++top] = e;  printf("%c",e);  }  }  void pop(){ //function to top pop element from stack  if (top == -1) {  printf("Error: Stack is Empty\n");  }  else {  printf("%c", stack[top--]);  }  }  void peek() { //function to display the top element of the stack  int i;  if (top == -1) {  printf("Stack is Empty\n");  }  else {  printf("%c \n", stack[top]);  }  }  int menu() {  int ch;  printf("\nPush - 1\nPop - 2\nPeek - 3\nReverse - 4\nExit - 5\nEnter your choice: ");  scanf("%d", &ch);  return ch;  }  void processArray() {  int ch;  char value;  for (ch = menu(); ch != 5; ch = menu()) {  switch (ch) {  case 1:  printf("Enter value to insert: ");  scanf(" %c", &value);  push(value);  break;  case 2:  pop();  break;  case 3:  peek();  break;  case 4:  while (top != -1) { //function to pop all elements  pop();  }  break;  default:  printf("Error: Wrong Choice.\n");  }  }  }  int main() {  processArray();  return 0;  } | |
| Output | |