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CONSTRUCTOR

PROPERTIES OF CONSTRUCTOR

1. SPECIAL MEMBER FUNCTION
2. AUTOMATIC CALL WHEN OBJECT IS CREATED
3. SAME NAME AS CLASS NAME
4. DECLARE IN PUBLIC SECTION // definition
5. INITIALIZE DATA MEMBER
6. DYNAMIC INITIALIZATION // uses
7. PASSING ARGUMENT ✓
8. NO RETURN (even void X)
9. OVERLOADING ✓
10. DEFAULT ARGUMENT ✓ // function
11. VIRTUAL X
12. INHERIT X

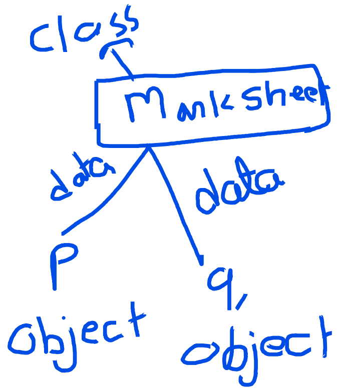
TYPES OF CONSTRUCTOR

1. DEFAULT OR NO ARGUMENT CONSTRUCTOR

2. PARAMETERIZED OR ARGUMENT CONSTRUCTOR

3. COPY CONSTRUCTOR

WAP TO FIND FACTORIAL



```
#include<iostream>
using namespace std;

  class  fact
  {
        private :   int  n , f ;  // only declaration

        public  :
                  fact ()      // special member function ( constructor )
                  {
                       f = 1;  // initialize data member
                  }
                  void   get()
                  {
                          cout<< " ENTER NO " << endl;
                          cin >> n;
                  }
                  void  cal()
                  {
                          for( int i = 1 ; i <= n ; i++)
                          {
                                f = f * i;
                          }
                  }
                  void  out()
                  {
                          cout << " FACT = " << f << endl;
                  }
          };
          int     main()
          {
                  fact   p ;   // f = 1

                  p.get();  //  n = 4 , f = 1

                  p.cal();  //  n = 4 , f = 24

                  p.out(); //   fact = 24
          }
```

```
// CONSTRUCTOR  OVERLOADING

//   PARAMETERIED  CONSTRUCTOR

              //  INITIALIZE AND PRINT COMPLEX NO.

#include<iostream>
using namespace std;

  class   complex
  {
            private : int  a , b;

            public  :
                 complex()
                 {
                       a = 0 ; b = 0;
                 }
                 complex( int  x )
                 {
                       a = x ; b = 0 ;
                 }
                 complex ( int  x  , int  y   )
                 {
                        a =  x ; b = y ;
                 }
```

```
               void   out()
               {
                     cout<< a << "+i" << b << endl;
              }
};
int    main()
{
      complex  p;   // IMPLICIT CALLING  CONSTRUCTOR
      complex  q (2);
      complex  t (3,2);

      p . out(); // 0 +i 0
      q . out(); // 2 +i 0
      t . out(); // 3 +i 2
}
```

or

```
int    main()
{
        complex  p = complex();    // EXPLICIT  CALLING  CONSTRUCTOR
        complex  q = complex(2);
        complex   t = complex( 3 ,2 );

        p. out(); // 0 +i 0
        q. out(); // 2 +i 0
        t. out(); // 3 +i 2
}
```

CONSTRUCTOR WITH DEFAULT ARGUMENT

INITIALIZE AND PRINT COMPLEX NO.

```
#include<iostream>
using namespace std;

  class   complex
  {
          private : int  a , b;
          public  :
  complex ( int  x = 0  , int  y = 0  ) // cons.  with default argument
  {
      a =  x ; b = y ;
  }
  void   out()
  {      cout<< a << "+i" << b << endl;
  }
};
int   main()
{
      complex  p;
      complex  q (2);
      complex  t (3,2);
      p . out(); // 0 +i 0
      q . out(); // 2 +i 0
}      t . out(); // 3 +i 2
```

```
}
//  this  POINTER

              //  ADDRESS  OF  THE  CURRENT OBJECT  IN  CLASS

#include<iostream>
using namespace std;

  class   test
  {
            private :  int  a;

            public  :
 test()
 {
             a = 5 ;          // implicit way   OR
      this -> a = 5;     // explicit way
 }

 void    out()
  {
         cout << "   " << a << endl;           //   5

         cout << "    " << this->a << endl;  //    5

         cout<<" ADDRESS OF THE OBJECT = " << this << endl; // 100
  }
```

```
};
int     main()
{
        test  p;
        p . out();
}
```

DESTRUCTOR

1. SPECIAL MEMBER FUNCTION

2. AUTOMATIC CALL WHEN OBJECT IS DESTROYED

3. SAME NAME AS CLASS NAME (~ :- tilde)

   ```
   e.g  ~test()
        {
        }
   ```

4. DECLARE IN PUBLIC SECTION

CALLING CONSTRUCTOR AND DESTRUCTOR

```
#include<iostream>
using namespace std;

  class  test
  {
         public :
         test()
         {
           cout<< " CONSTRUCTOR CALLED = " << this<<endl;
         }

        ~test()
         {
                cout<< " DESTRUCTOR  CALLED = " << this <<endl;
         }
  };
  int    main()
  {
          {
                test  p ;
          }
  }
```

ans :-

```
constructor  called   65524
```

```
    destructor    called   65524
```

SEQUENCE OF CONSTRUCTOR AND DESTRUCTOR

```
int   main()
{
      {
            test  p  ;
            test  q  ;
            test   r ;
      }
}
```

```
CONSTRUCTOR  CALLED      100 → p
CONSTRUCTOR  CALLED      200 → q
CONSTRUCTOR  CALLED      300 → r

DESTRUCTOR    CALLED     300 → r
DESTRUCTOR    CALLED     200 → q
DESTRUCTOR    CALLED     100 → p
```

CONSTRUCTOR	DESTRUCTOR
1. PASSING AGRUMENT ✓	1. NO ARGUMENT X
2. OVERLOADING ✓	2. OVERLOADING X

3. VIRTUAL X **3. VIRTUAL** ✓

```
                    //  COPY CONSTRUCTOR
               // INITIALIZE AND COPY COMPLEX NO.
#include<iostream>
using namespace std;

  class   complex
  {
         private : int  a , b;

         public  :
            complex()   //   DEFAULT CONST.
            {
                 a = 0 ; b = 0 ;
            }
            complex ( int  x , int  y ) // PARA.  CONST.
            {
                 a = x ; b = y ;
```

```
        }
        complex ( complex  &x ) // COPY  CONST.
        {
               a = x . a;
               b = x . b;
        }
       void  out()
       {
               cout << a << "+i" << b <<endl;
        }

   ~complex()  // DESTRUCTOR
     {
     }
};
      int    main()
      {
         complex  p (3,2);    // PARA.  CONSTRUCTOR

         complex  q (p) ;    // call COPY  CONSTRUCTOR

         p. out(); // 3 +i 2

        q. out(); // 3 +i 2
     }

/*
---------------------------------------------------------------------------------
```

int a = 5 ; // int a(5) ;

complex q (p); // complex q = p;

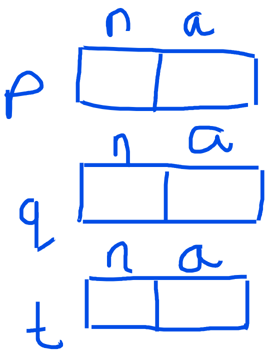
--

STATIC DATA MEMBER AND STATIC MEMBER FUNCTION

1. NORMAL DATA MEMBER

private : int n , a ;

test p , q , t; (OBJECT)

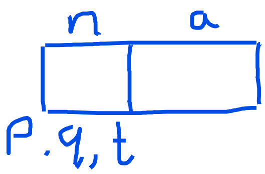


seperate memory

2. STATIC DATA MEMBER

private : static int n , a;

test p , q , t; (OBJECT)



common memory

```
#include<iostream>
using namespace std;

  class  test
  {
         private :     static  int  n , a;  // static data member

         public :
                      test()   // CONSTRUCTOR
                      {
                           n++;
                           a++;
                      }
static  void   out()   // STATIC  MEMBER  FUN.
{
       cout<< " TOTAL NO. OF OBJECT = "  << n << endl;
       cout<< " NO. OF ALIVE OBJECT  = "  << a << endl;
}
 ~ test()    // destructor
   {
        a--;
   }
};

int  test :: n = 0 ;  // DECLARE  STATIC  DATA  MEMBER
int  test :: a = 0 ;
int   main()
{
      test  p , q , t ;
      test :: out();    // n = 3 , a = 3
      {
            test  u , v;
            test :: out(); // n = 5 , a = 5
      }
      test :: out();  // n = 5 , a = 3
 }

---------------------------------------------------------------------
               // ARRAY  OF   OBJECT

              //  INPUT AND  PRINT N RECORDS

#include<iostream>
using namespace std;

  class   student
  {

      private:   char  name[10];
                 int    roll;
                 static  int  n;

      public :         student()
                       {
```

```
                    n = 100;
                }
                void  get()
                {
                        cout<<" ENTER NAME " << endl;
                        cin >>  name;
                        roll = n;
                        n++;
                }
                void  out()
                {
                        cout<<" NAME = " << name << endl;

                        cout<<" ROLL = " << roll << endl;

                }
};

int  student :: n  ;

int  main()
{
      student  p[10] ;  // object
      int  i , n ;

      cout<< " ENTER SIZE " << endl;
      cin >> n;
```

```
        for( i = 0 ; i < n ; i++ )
        {
              p[i] . get();  // input records
        }

        for( i = 0 ; i < n ; i++ )
        {
             p[i] . out();  //  print records
        }
  }
```

DMA (Dynamic Memory Allocation)
Memory using

1. Static or Compile time Allocation [Array]
2. Dynamic or Run. time Allocation
[Pointer]

DYNAMIC OR RUN - TIME ALLOCATION

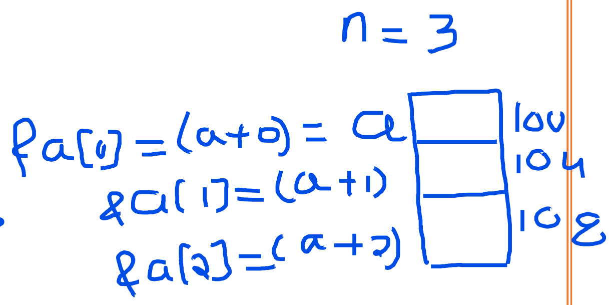
c	c++	
1. malloc()		
2. calloc()		
3. realloc()	new	// CREATE MEMORY
4. free()	delete	// DESTROY MEMORY
function	keyword	

DYNAMIC MEMORY ALLOCATION (DMA)

new :- **syntax**

new datatype

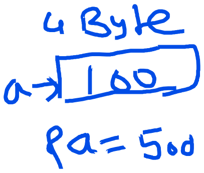
e.g. 1. FOR INTEGER DATA



```
int *a;

a = new int;
```

2. FOR ONE DIM. ARRAY // VECTOR



```
int *a;
a = new int [ n ];
```

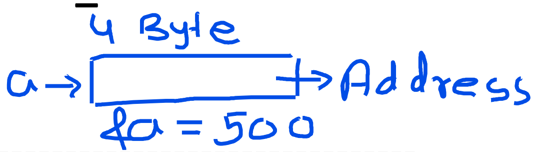
&a[i] = (a+i)

----

delete :- syntax

delete pointer_name

e.g. delete a; →



DYNAMIC INITIALIZATION THRUGHT CONSTRUCTOR

DYNAMICALLY INPUT AND PRINT N NOS

```
#include<iostream>
```

```
using namespace std;

  class vector // one dim.
  {
        private : int  *a , n;

        public  : vector()
                {
                }
                vector( int  x )  // DYNAMIC  CONSTRUCTOR
                {
                   n = x ;
                   a = new  int [n]; // DYNAMIC INITIALIZATION
                }
                void   get()
                {
                     cout<<" ENTER NO " << endl;
                         for( int i = 0 ; i < n; i++)
                         {
                                 cin >> a[i];
                         }
                   }
                   void   out()
                   {
                         cout<<" NO = " << endl;

                         for( int i= 0 ; i < n ; i++)
                         {
```

```
                                        cout << a[i] << endl;
                                }
                        }
                    ~vector()
                        {
                                delete  ~~a;~~ [] a;
                        }
};
int    main()
{
        vector  p(3);

        p . get();  // 10 , 20 , 30

        p . out(); //  10 , 20 , 30
}
```