Operator Overloading

- performing operations blw of two so objects of a class.

operators that can Not be overloaded

:: -> scope resolution operator

· dot operator

?: -> Ternary operator

* -> pointer de referrencing operator. got was beginned to examine

sizeof -> size of operator.

operators that can be overloaded

Unany operator

++ -> pre / post increment The roll of any kind week

- -> pre /post decrement

! -> logical Not operator

Binary operator

> Arithmetic operator

> Relational operator

> Logical operator

```
-> Bitwise operator
1, 1, ~, << . >>
→ () → function call operator
  > " -> Arrow operator
    [] -> Array subscript operator
    cin >> cout << . → Input / output operator
 > new, delete
     Conversion operator.
      converting Userdefined data type to a least
        Basic datatype
       converting basic data type to a User defined data
          type.
       converting werderined data type to another
        userdefined data type.
            Mixed mode arithmetic.
  Arithmetic operators
```

063 = 061. operator += (ob 2);

```
A (int x = 0) {
               Q = x;
         A operator + (A t)
               A 05;
               0b.a= a+t.a;
               return ob;
          ) () works biov
               cout << ob. a;
int main () for son h
         A ob(1), ob 2 (4), ob 3;
         0 63 = 061 + 062; // compiler interprets as
         ob3.show()
                          11 061. operator + (06 2)
         return 0; [11: 063 = 061. operator + (062);
```

class A

int a;

```
class A
class A
                                                                         int at;
      int a;
                                                                          public:
      public:
                                                                            A (int x=0)
        A (int x = 0) }
                                                                                 a = x;
              \alpha = \chi;
                                                                            bool operator < = (A ob) {
       void operator + = (A & t)
                                                                                   if (a <= 0b.a) {
                  a + = t.a;
                                                                                           return true;
                                                                                     else 1
       Void show ();
int main () {
                                                                             Void
                                                                                   show;
        A 061(3), 062(5);
        ob 2 + = ob 1;
                          11 ob 2. operator + = (ob 1);
        show (0b2);
                                                                     int main ()
                           11 062 = 062.0 perator += (061);
                                                                            A ob1(2), ob(3);
                                                                            if ( 16 1 <= 06) { | | compiler interprete a
Relational operators
                                                                                   Cout <<"True"; // ob 1. operator <= (ob);
       Ob 1. operator < = ( ob 2);
                                                                               else /
                                                                              cout << "Fause";
                                                                              return o;
```

```
Ritwise operator
  Logical operator
                                                              class A 1
                                                                     int a:
class A
                                                                     public:
      int a:
                                                                        A line x = 0) {
       public:
         A (int x = 0)
                                                                             Q = x;
             a = x;
         A operator 28 (A ob)
                                                                         A operator 1 (A ob) {
              A.f.
                                                                                 An tigo 6 1 1 1000
              t. a = a & & ob. a;
                                                                                t.a = a | ob.a;
               return 👪 t:
                                                                               return Le.
        void show () {
             cout << ob.a;
                                                                int main () }
                                                                     A 60 ob 1(3), ob 2(4), ob 3
int main () /
                                                                     1/063 = 061 & 062;
                                                                                            06 1. operator & (06 2) //
 A Ob L(3), Ob 2 (4), ob 3;
                                                          063 = 061 / 062; 063. show();
  063 = 061 & 8 062;
                            11 063 = 061. operator 88 (062);
   0b3.show();
                                                                      return o;
                          // : 0b1. a # 0
                             // .: ob1. a = 1
                             11 - 0b2. a! = 0
                                                            - 0b3 = 0b1 | 0b2;
                                  · ob2. a = 1.
                            11 = 0b3.a = 1811 = 1.
                             11 -: 0b3.a = 1.
                                                                                            ob3. a = 111 = 7.
                                                                ob2, a = 4 = 100
                                                                                       .: 063.a = 7.
```

```
class A S
function call per operator
                                                                 int a;
                                                                 Public:
class A
                                                                  A (int 20)
     int a;
                                                                           a= x;
      public:
          A (int x = 0) {
                                                                     A operator () (Am)
              a = x;
                                                                               A t;
         A operator () ( int x)
                                                                               return t;
                  A £;
                  t.a = * a + n;
                  return t;
                                                              int main ()
                                                                      A ob1 (3), ob2 (4), ob3;
                                                                      063 = 061(062);
                                                                       returno;
 int main ()
         A ob 1 , ob 2 ;
                                                                     Arrow operator
         0b2 = 0b1(5);
                            11 ob2 = 0b 1. operator()(5);
         return o;
                                                            class A
                                                                  int a;
                                                                  Public:
                                                                     A (int n = 0) ∫
                                                                          a=x;
                                                                     A* operator > ()
                                                                             return this;
```

```
int main ()
                                                         int * buffer:
       A 061(3), 062(4);
                                                         int size;
                                                           Public :
       Ob 1 -> show ();
                    11 (ob 1 operator -> ()) -> show
                                                              A (int x) {
        ob 2 → show();
                    11 (ob2. operator - ()) -> Show
                                                                 size = x; = 2512
        A * ptr = & ob1;
                                                                 buffer = new int [size];
        ptr - show (); - a resurrace
                                                                 for (ine i = 0; i< size; i++) {
        return 0;
                                                                   buffer [i] = i+1;
 Array subscript operation
class A
                                                                int operator [] (int x) {
     int & int & ize
                                                                     if (x > size) {
     PUBLIC:
         A (int x == )
                                                                    return -1;
             Size = N;
                  a = new int [size];
                                                                       return buffer [a);
                 for (i=0; i(n; i++)/
                          Q(i) = i+1;
           int operator [] (inta) {
                                                       int main ()
                   il (2 > size) {
                                                             A ob(10);
                        return -1:
                                                             cout < n; // 3.
                   return a (i);
```

class A

```
main () {
                                                            int
 cin , cout operator
                                                                    A ob1(2);
class A
                                                                    A 0 b 2;
      int a;
                                                                    cin 55 ob 2;
       public:
                                                                      cout << 0b1;
         A (int x = 0)
                                                                                         11 1 is called
             d = x;
                                                                       cout << 061 << 062;
        friend void operator >> (istream & is, Abob)
                                                                                               112 is called.
                is >> ob. a;
                                                           Mixed mode arithmetic
              // memory allocation of cin given
              Inew name is.
              Il cin, cout are part of class istream
                                                            class A {
              I and ostream ... to use in and cout
                                                                   int a;
             I in another class, friend is used.
                                                                   public:
                                                                        Aline x = 0)
     friend void operator << (ostream & os, const A & ob)
                                                          do A and a a = x;
                ( D. do >> 20
                                                                        A operator + (int n) {
                                                                                 A t;
                                                                                 t . a = a + x;
                                                                                 return t;
  friend ostream operator << (ostream & os, const A ob)
          05 << 0b.a;
          return os;
```

112

```
operator
                                                                                        e aithereublabe blue pre maremi
   int main ()
                                                                    class A
         A ob1(3), ob2;
                                                                             int a;
          062=061+5;
                                /1 ob 2 = 0 b 1 . operator + (5).
                                                                              public:
                                                                                 A ( int x = 0) |
           ob2. show ();
                                                                                         a = x ; F }
                                                                                  A operator + + () {
class A
        int a;
                                                                                           return * this;
         public:
             A (int n=0) /
                   a = n;
                                                                        int main ()
           friend A operator + (int x, and A ob ) {
                                                                                   A ob1 (3), ob2;
                                                                                    0 b 2 = ++ 0 b 1; // 0 b 2 = 0 b 1. operator ++
                          A £;
                          t. a = n + ob.a;
                                                                                       110b2 = 0b1. Operator + + ();
                          return t;
                                                                                      062 . show ();
                                                                                      0b1. show();
    int main () {
              A ob1(3), ob2;
               0b2 = 5 + 0b1;
```

```
class A (
  To differentiate blu pre increment and post increment
                                                                       int a;
                                                                                       Tribeattore golding: war
   pperators
                                                                        public:
                                                                     1999 A (int x = 0) 1 0 450 0 100 -
  A operator ++ (int)
                                                                                  a = x;
               + . . a = a + + :
                                                                             ^ operator ! () {
               return t;
                                                                                      t. a = ! a ;
i dass is
                                                                                      return t;
class A
      int a;
       public:
                                                                     int main () {
          A (int x = 0) $
                                                                             A ob1(9), ob2;
               a = \chi;
                                                                              0b2=! ob1;
          A operator ++ (int) {
                                                                                062.show ();
                                                                                 0 b1. show ();
                      t.a= a++;
                      Peturn t;
                                                                 If friend function
                                                                         friend A operator ! (A& ob) {
 int main ()
                                                                      an in the A t;
          A ob1(3), Ob2;
                                                                                   t. a = ! (ob. a);
              062 = 061 ++;
                                                                                   return t;
              061. Show ();
            Obl. showl);
```

Conversion operator overwading -> Basic Data type to User defined data type. class A int a: public: A (int n = 0) {

a = 2;

Void show() cout << a;

int main ()

A 0b1 = 5; // A ob 1 (5);

ob1. show(); 11 gets converted to A 061(5).

-> user defined data type to besic data type.

int main ()

A ob(50); cout << x;

class A

int a; public:

A (int x = 0) (

Q=2;

-> User defined data type to User defined data type.

By overboading assignment operator

operator int () (Il operator is a keyword. return a: 11 return type is int. // return type is //mentioned after

int x = ob; // converts into x = int(ob).

11 n = ine (0b);

Il key word operator.

Il type casting occours. Il return type is mentioned after keyword operator.

```
class B;
class A
                                                           class A
     int a;
                                                                int a;
     public :
                                                                public:
        A(int x = 0)
                                                                    A (B ob);
             a = 7;
                                                            );
                                                            class B
    int get-a () (
           return a;
                                                                int b;
                                                                 public:
                                                                     B (int y = 0) {
                                                                          b=y;
                                                                      int get-b(){
 class B
                                                                           return bi
       int b;
      public:
          B (A 6.06)
                                                                      void show ()
             b = ob.get_a();
                                                                            cout << b;
           Void show ()
cout << 6:
                                                              A:: A(B 0b) {
                                                                       a = 0b.get b();
 int main () [
                                                             int main()
      A oba (5);
                                                                  A oba;
      Bobb;
                      11 obb = B(oba);
                                                                  B obb (5);
      066 = 05 a ;
                       11 obb = B(oba);
                                                                   0ba = 0bb;
                                                                                 11 oba = A (obb);
      obb.show();
                                                                   oba. Show ();
                         11 typecasting is done.
```

```
-> By overloading assignment operator.
                                                                  int main ()
                                                                           A oba; B obb;
class B;
                                                                           0ba = 0bb;
                                                                                              // oba. operator = (obb);
 class A
                                                                            oba. show ();
                                                                                              11 ob a. operator = (obb);
      inta;
       public:
           Void operator = (B Ob);
                                                                    class A
                                                                         int a;
  class B
                                                                          public:
       int b;
                                                                             A(int x = 0)
        public:
                                                                                   \alpha = \pi;
             B(inty = 0)
                  b = y;
           int get - b () }
                                                                     class B
                 return b;
                                                                           ine b;
                                                                            public:
                                                                                B( int y = 0) {
             Void show () {
                   cout << b;
                                                                                    b = y;
                                                                                operator A()
                                                                                                     Il same as
                                                                                      return A(b); ! ! Operator int () {
 void A :: operator = (B ob) {
                                                                                                     11 same as
            a = ob.getb();
                                                                                                       11 operator int() (
```

```
A :: operator B()
int main ()
                                                                  return B(a);
      A oba;
                  // oba = A(obb);
      Bobb;
      oba = 066;
                                                            int main () [
      ob a. show ();
                                                                   A ob a (5);
                                                                     Bobb;
                                                                     066 = 06a;
                                                                                    11 obb = 8 B (oba);
  class B;
                                                                    Obb.show();
                                                                                       11 obb = B(oba);
   Class A
       int a;
        public:
            A(int x = 0)
                                                          Mixed Mode Arithmetic
                  a=n;
                                                         class B;
            operator B();
                                                          class A
                                                                int a;
                                                                public:
                                                                   A (int n= 0) [
  class B {
                                                             2 a = x;
       int b;
        ривис:
                                                                friend A operator + (intx, A 206) (
           B (inty = 0) }
               b = y;
                                                                           t. a = x + 06.a;
                                                                           return t;
```

```
friend A operator + (Ax. Aob)
                                                         class B;
                                                          class A
            A Ł;
                                                                int a;
           t.a = x.a +0b.a;
                                                                 public:
                                                                    A (int = 0)
            return t;
                                                                          a = x;
  int main ()
                                                                    A operator + (int x)
         A 0b1 (6);
                                                                               A t;
          A 0b2;
                                                                               t.a = 1 + a;
          062 = 10+06 1; // first friend fundion is
                                                                              return t;
                                     11 called.
            062. Show();
                                                          A operator + (Ax)
                                                                                               -(2)
                                                        -10 m & -10 t.a = (x.a+a)
    If the first friend function was commented out
                                                                             return t;
         second friend function will run.
           " Az is an object of A class of the
              value of n as 10.
         .. 10 in converted into an object of type
         A as A (10). That is Az.
                                                                friend A operator + (A ob, int x)
                                                                             At;
                                                                              t. a = x + 0b. a;
                                                                              return t;
```

```
A oba (10);
                                                   public;
                                                      A (int x = 0) (
SA Ob;
11 ob = oba +10;
                                                          a = x;
 0b = 0ba + 10; // 0b = 0ba. operator + (10)
 Protorigo o R
  ob.show(); ob = Oba.operator + (oba, 10)
                                                      A operator + (Ax)
                                                              return A (x+a.x);
               : 1 and 3 creates
                       Ambigious situation
                                                       Operator int ()/
     for Tank 3 mambigious occours.
                                                              return a:
          .: O is woverted into 2 function.
                                               int main () /
  If () is commented out,
                                                     A ob1(2); int & ob;
            and 3 do Not
                                                      A ob 2 (3);
               create ambiguity
                                                      0b = 0b1 + 0b2;
                                                                        // int ob = A ob 1 + A ob 2
                                                      ob. show ();
                                                                        · ob = int (A ob 1 + A ob 2).
                                                                        .. 0b = int ( ob 1 + 0b 2) .
```

class A f

int a;

int main() (

```
class A
class A
                                                                   int a;
    int a;
                                                                    public :
     public:
                                                                         A (int a)
        A (int n = 0)
                                                                          this > a = a;
                               1000
             \alpha = \tau
                                                                          operator int ()
        A operator + + () {
                                                                                   return q;
                a++;
              return * this;
                                                               int main ()
        operator int () {
                                                                        A 061(5), 062 (6);
               return a;
                                                                          int x = 06 1 + 062;
         void operator + = (A ab) [
                                                                        cout << a.
                  A + = ob.a;
                                                             Methode 2
                                                               clars A
                                                                      int a;
                                                                       public:
                                                                           A (int a = 0) }
int main ()
                                                                               this > a = a;
     A ob1(6);
 A 062(7);
     0b2+=(++0b1);
                                                                          int operator + (A062)
     cout << 062;
                                                                                   return (a+062. a);
```

```
class A
int main ()
                                                          int a;
      A ob1(5), ob2 (6)
                                                           public:
      int x = ob1 + ob2. 11 ob1. operator + (ob2).
                                                               A (int a = 0)
                                                                    this \Rightarrow a = a;
      coud << x;
                                                               operator int () {
                                                                        return a;
class A
      int a;
      public:
                                                               A operator + + (int) {
        A(int a=0) {
                                                                        A t;
            this -a = a;
                                                                        t. a = a ++; // t.a = a;
                                                                        return t;
       A operator + (A 10b)
              return A (a+ob.a);
                                                        int main () {
                                                                A ob1(5), ob2 (6)
                                                                 A x = 061 ++ -062;
      b = a 0; 10 . 12. 13
                                                                 cout << x;
               a=a+1,
         post or preincrement operators (an
     ONLY be applied on variables or
      memory ocation, NOT on constants.
       a++ is possible. .: a= a+1.
       But 5++ is NOT possible, = 51 = 5+1.
```

11 a = a + 1;

```
class A {
                                                                     int a;
    int a;
                                                                       public :
     public:
                                                                            A (int a=0) { (int a=0) A
                                                                             this \rightarrow \alpha = \alpha;
             this > a = a;
                                                                            int operator () (int x)
           A operator ++ ()
                   return A(++a);
                                                                                     return a;
                                                                                     return a;
  int main ()
           A ob1(5), ob2(6)
           int n = 10 - ++0b2;
                                                                     int main ()
            cout << n.
                                                                               A 061(5), 062 (6);
Il class A to
                                                                                A 063;
                                                                                063 = 062 (061 + 5);
                                                                                 ( out << ob3;
```

class A

```
class Hours
                                                              int h;
class A
                                                                                                 con
                                                              public:
 int a;
                                                                  Hours (int h=0) {
    public:
       A (int x = 0) | (0 = 0 = 0 = 0 = 0 = 0 = 0
                                                                       this > h = h:
            this - 0 = a;
                                                                 int get - h ()
         A operator * = ( A & 0b) {
                                                                         return h;
              a * = 0b.a
                 11 return * this.
                Il return A (a)
                                                          Class Munite
                 return a.
                                                                    int m;
                                                                      public:
          operator int () [
                                                                         Munites (int m = 0)
                 return a;
                                                                               this -m = m;
                                                                          Munites (Hours & ob) {
                                                                                  m = 0b.get_h ();
 int main () /
        A 051(5), 062(6),
       A ob 3 = 061 * = 0b2;
          Cont << 0P1.
                                                          int main () [
          cout << 062 << 063;
                                                                  Hours n (3);
                                                                    Munites m;
                                                                    m = h; // m = M(h)
                                                                      m. show ();
```

```
Methode 3
 Methode 2
                                                              class Hours
   PERM
class Munites
                                                                     int h;
         int m;
                                                                      public:
         public:
             Murites (Hours 20b) [
                   m = 06. get - h ();
                                                                          Operator Munites ();
              Muride (int m = 0) }
                        this -> m = m;
                                                                 class Muriter
                                                                         int m;
                                                                         public:
 int main ()
                                                                            Muniter (int m = 0)
                                                                                   this -> m = m;
          Hours h (3);
             Murider m;
              m = h; // m.operator = (h)
              m. show ();
                                                                 Munites :: Hours (Hours Ob)
                                                                            m = set ob. get_h();
                                                                           return m;
                                                      5
                                                               int main ()
                                                                      Hoursh (10); Murites mi
                                                                       m = h;
```

m. show();

```
Void * operator new (size-t Sz) [ saft musta
New Delete operator overwading
                                                               Void * p;
 int main () {
                                                                Prinew int [12];
      int * ptr = new int;
                                                                if (bi = MATT)
       * ptr = 10;
                                                                      return p;
                                                                           Jall 21 garry TL
         cout << * ptr;
                                                                 else
                                                                     return pillo 1993
                    -1000
         ptr
                    new int
         * ptr = 10 .
                                                     Void * operator new (lize t 5)
void * operator new (size_t sz) {
                                                                 void * p;
                                                               P = :: new int [12];
             Void * p ,
                                                                 for (int i = 0; i <s2; i++){
               f = malloc (sz);
                                                                       (char* p) [i] = 0;
               if (p ! = NULL) {
                   return p;
                                                                  return p;
                   return p;
                                                      For delete overwading
                                                        delete ptro;
```

```
return type of new ic void *.
  return type of delete is void.
If array is also cated
   Void * operator new[] (size-t 52)
                11 code;
   Void operator delete [] (Void *p) {
                  : delde (p),
  void operator delete (void * p)
              free (p);
```

a array subscript operator must be added

after new or delete. Sor an array.

```
Class Number (
       int n;
                    19 # War
        public:
         Number (int n = 0)
              Void * Operator new (size t sz) {
                    Void * ptr = :: new more
            if (pts ! = NULL)
                          * ptr = 5;
                     return per;
  };
  int main () /
            Number * ptr = new Number (5);
             ptr - show ()
            delete ptr;
```

```
Void * operator new (size-t sz, char ch)
                 Yold # P;
             P=::new char [12].
             * P = ch;
                   return p;
void operator delete (void * pto) {
                if (ptr ! = NULL) {
                       : detete (ptr);
```