

2008, " :
603,899205 :

)" 5 (2

50—)25x2(—

50—)25x2(—

100— "

. Java C# , C ,

. Java C# , C ,

!

/

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!

)1(

)2(

)3(

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" "

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) 50(

) 25— (4-1

. 4 , 3 , 2 , 1

.1

)y , x(

{ . y x , 0 }

{ . }

)y , x(

{ . y x , 0 }

{ . }

(a , n , p1 , p) 1

{ , 0 , a }

{ . 1 ≤ p1 ≤ p ≤ n , n . p p1 , n }

{ ... }

0 p = p1)1(

x ← (a[p[, a]p1]) - - -)2(

y ← (a , n , p1 + 1 , p) 1)3(

(x , y) - - -)4(

(a , n , p , p2) 2

{ , 0 , a }

{ . 1 ≤ p ≤ p2 ≤ n , n . p2 p , n }

{ ... }

0 p = p2)1(

x ← (a[p[, a]p2]) - - -)2(

y ← (a , n , p , p2 - 1) 2)3(

(x , y) - - -)4(

/3 /

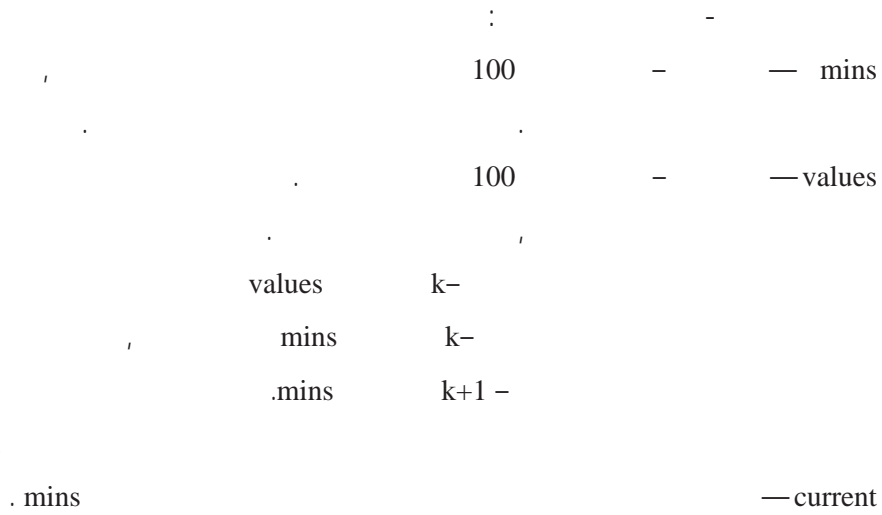
(a, p, n) 3
 { , 0 , a }
 { $1 \leq p \leq n$, $n \cdot p \cdot n$ }
 { ... }
 $((a, n, p, n) 2 , (a, n, 1, p) 1) - - -)1($

(a, n) 4
 { . n , 0 , a }
 { . n }
 { ... }
 $k \leftarrow (a, 1, n) 3)1($
 $: n^2 i)2($
 $t \leftarrow (a, i, n) 3)21($
 $t > k)22($
 $k \leftarrow t)221($
 $k)3($

) (5 a

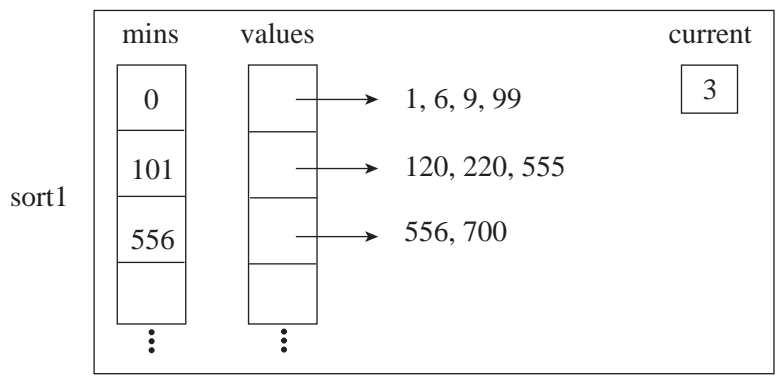
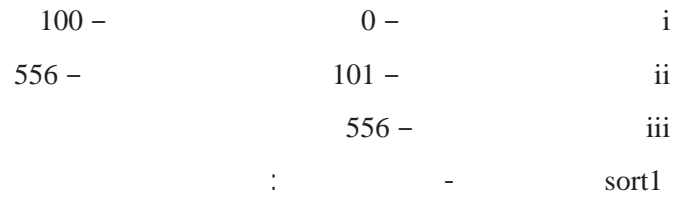
	1	2	3	4	5
a	4	3	7	6	10

$? (a, 4, 5) 3$
 $(a, p, n) 3$
 $? 1 \leq p \leq n$
 $. 4$
 $? (a, 5) 4$
 $. 3$
 $? n a$
 $(a, n) 4$



1, 700, 556, 120, 220, 9, 6, 99, 555 :

: _____



C

.sortByRange — - C .

sortByRange sbr , insert C .

. num

, sbr values num

num , sbr values num

. sbr mins

sbr , addRange C .

.sbr values r **sortByRange**

. r , sbr

sbr

. ? i .

. ? ii

:_____

C# Java

SortByRange — - C# Java .

, **SortByRange** insert C# Java .

. num

, values num

num , values num

. mins

, **SortByRange** addRange C# Java .

. values r

r

. ? i .

. ? ii

List< T > , Node< T > :_____

.0 k . k
 .) (5% ****
 25% , 5% ***
 50% , 25% **
 50% *
 game g C i
 gamesData gd C ii
 , minAge
 4
 /7 /). ,C# - Jave - : (

Game —

C# Java

C# Java

GamesData —

C# Java

. ii-i ,

i

k . k

ii

.0

)

(

5%

25%

, 5%

50%

, 25%

**

50%

*

, **Game**

C# Java

i

, **GamesData**

C# Java

ii

, minAge

4

List< T > , Node< T >

:_____

.set get

2 5 7 4 2 1 8

:_____

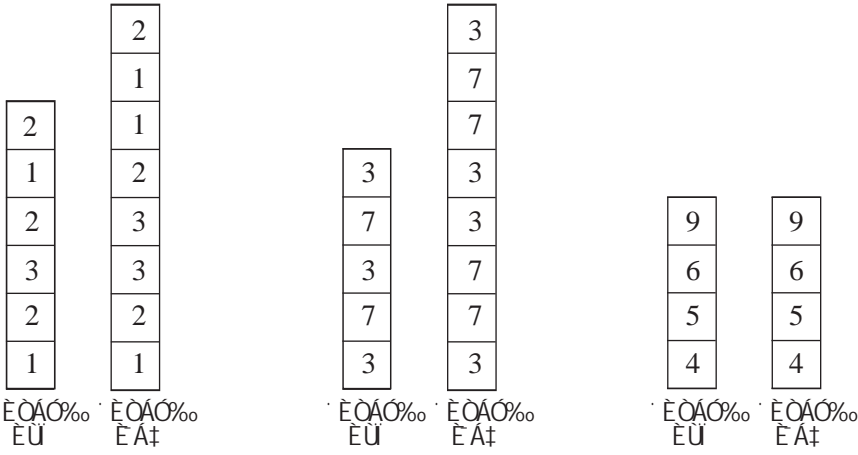
1 7

/ —Java , C# , C , —

,) (

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?

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:_____

:C_____

:C# Java_____

Stack< T >

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) 50

:

14-9' ,

18-15' ,

21-19' ,

39-31' ,C#

;30-22' ,Java

) 25—

(8-5

.5

BX AX

AX

, iii-i ,

, iii-i

```

i.      MOV      CX , AX
        MOV      DX , BX
        CMP      CX , 0
        JNS      A1
        NEG      CX
A1:     CMP      DX , 0
        JGE      A2
        NEG      DX
A2:     CMP      CX , DX
        JG       SOF
        MOV      AX , BX
SOF:    NOP

```

/10

/

).

iii-ii

:

(

ii. PUSH AX
 PUSH BX
 CMP BX , 0
 JNS A1
 NEG BX
A1: CMP AX , 0
 JNS A2
 NEG AX
A2: CMP AX , BX
 JG A3
 POP AX
A3: POP AX
SOF: NOP

iii. PUSH AX
 PUSH BX
 CMP AX , 0
 JGE A1
 NEG AX
A1: CMP BX , 0
 JNS A2
 NEG BX
A2: CMP AX , BX
 JG SOF
 POP AX
SOF: NOP

). 5 :

603.899205' , " ' ,

- 11 -

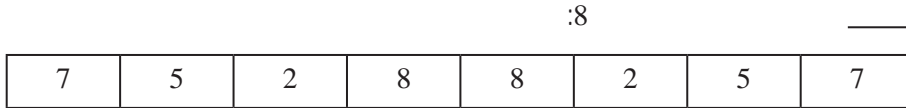
). (.

:

```
START:  MOV     AX , C83BH
        MOV     BX , A89CH
        SHL    AX , 1
        OR     AL , 33H
        NOT    BL
        ADD    AX , BX
```

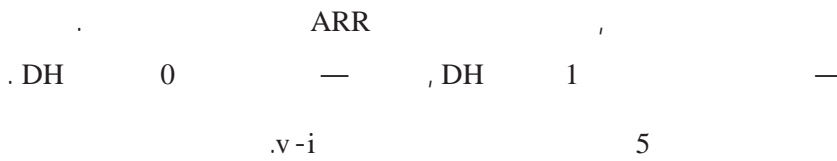
AX , BX , ZF , SF , CF

/12 /



: ARR

ARR DB 20 DUP (?)



```

i.      MOV     AH, 0
        -----
        MOV     CX, 10
        LEA    BX, ARR
A1:     MOV     AL, [BX+SI]
        PUSH   AX
        INC    SI
ii.     -----
        JNZ    A1
        MOV     CX, 10
iii.    -----
        MOV     DL, [BX+SI]
        CMP    AL, DL
iv.     -----
        MOV     DH, 0
        JMP    A4
A3:     INC    SI
v.      -----
        MOV     DH, 1
A4:     NOP
    
```

). (.

: Y A

A DB 10 DUP (?) ; 9 0) (

Y DB ?

Y , 3*Y) (

.) (3 0

, iv-i ,

, iv-i

```

i.  MOV    SI, Y
     ADD    SI, SI
     ADD    SI, SI
     MOV    A[SI], 0

```

```

ii.  XOR    AL, AL
     LEA   BX, A
     MOV   [BX + 3 * Y], AL

```

```

iii. MOV    SI, 3
     MOV    AL, Y
     XOR    AH, AH
     MUL   SI
     MOV    SI, AX
     MOV   A[SI], 0

```

```

iv.  MOV    SI, Y
     MOV    AX, 3
     MUL   SI
     MOV   A[SI], 0

```

. D , C , B , A :

.7

A DB 8 DUP (?)

B DB 8 DUP (?)

C DB 8 DUP (?)

D DB 10 DUP (?)

.0

D C , B , A

.2 A+B+C

D

10010000 11111110 , 11011100 3 : _____

:) (C B , A

A

1	1	0	1	1	1	0	0
---	---	---	---	---	---	---	---

B

1	1	1	1	1	1	1	0
---	---	---	---	---	---	---	---

C

1	0	0	1	0	0	0	0
---	---	---	---	---	---	---	---

:1001101010 D

D

1	0	0	1	1	0	1	0	1	0
---	---	---	---	---	---	---	---	---	---

BL

AX

.8

.AX

1011

, 0110110010110110 :

AX

: _____

.3

BL

) 25— (12-9

$$x + y - z = 1$$

$$2x + 3y + \alpha z = 3$$

$$x + \alpha y + 3z = 2$$

:

9

α

?

α

?

α

$S \rightarrow AbA$: G_1 i . .11

$A \rightarrow AB | \varepsilon$

$B \rightarrow aa$

? G_1

$B \rightarrow a$: G_1 ii

. G_1'

? G_1'

$S \rightarrow AbA$: G_2 i .

$A \rightarrow AB | a$

$B \rightarrow a$

? G_2

$B \rightarrow \varepsilon$: G_2 ii

. G_2'

? G_2'

$S \rightarrow AbA$: G_3 i .

$A \rightarrow ABB | \varepsilon$

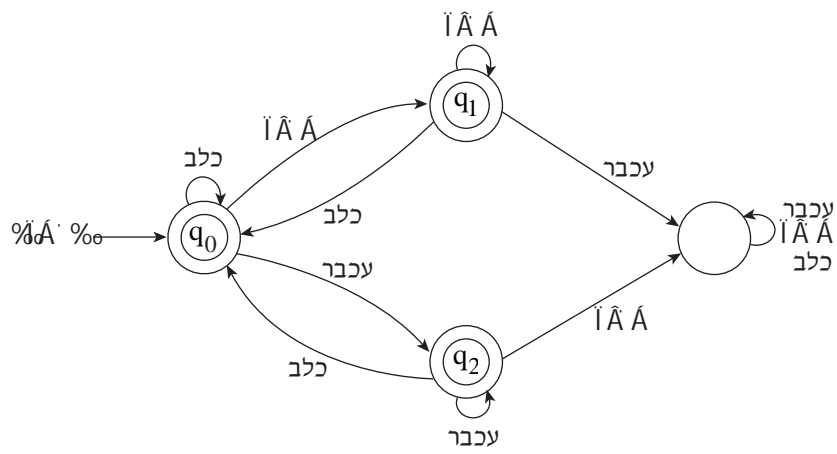
$B \rightarrow a$

? G_3

$B \rightarrow \varepsilon$: G_3 ii

. G_3'

? G_3'



) 25— (16-13 _____ ,

...3123123123123... : **.13**

{1, 2, 3} "

— — :_____

23123

232 - 2312

{1, 2, 3} "

1 , —

:_____

:

31123

31231

3123111

: .14

.w k #_k(w) w k
 . { 0,1 } " L₅-L₁

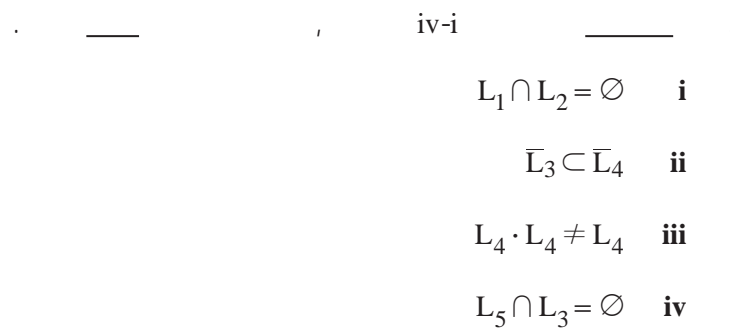
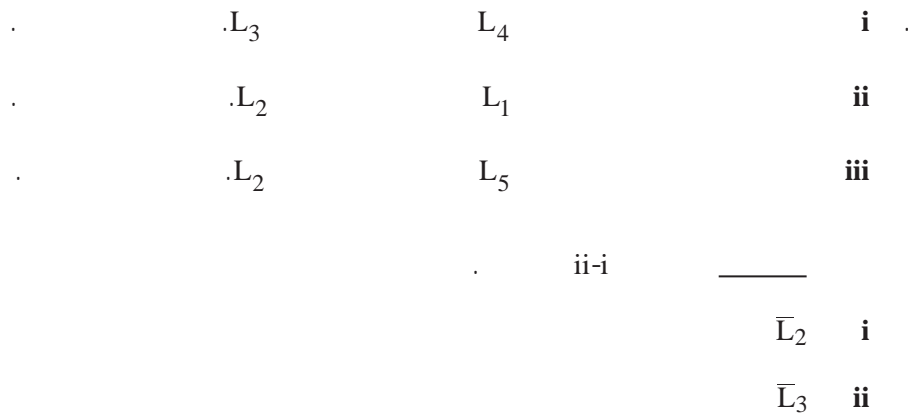
$$L_1 = \{w \mid |w| > 5\}$$

$$L_2 = \{w \mid \#_1(w) < 5\}$$

$$L_3 = \{w \mid \#_0(w) = 5, \#_1(w) = 5\}$$

$$L_4 = \{w \mid \#_0(w) = \#_1(w)\}$$

$$L_5 = \{w \mid w = xxy, 0 < |x| < 5, \{0, 1\} \text{ " } \text{---} y, x \}$$



: { a, c } " L₁ .15

$$L_1 = \{c^n a^{n+2} \mid n > 0\}$$

: { a, b, c } " L

$$L = \{w_1 w_2 w_3 \dots w_k b^k \mid k > 0, w_i \in L_1\}$$

: , k = 3 , L caaaccaaaacaaabbb :_____

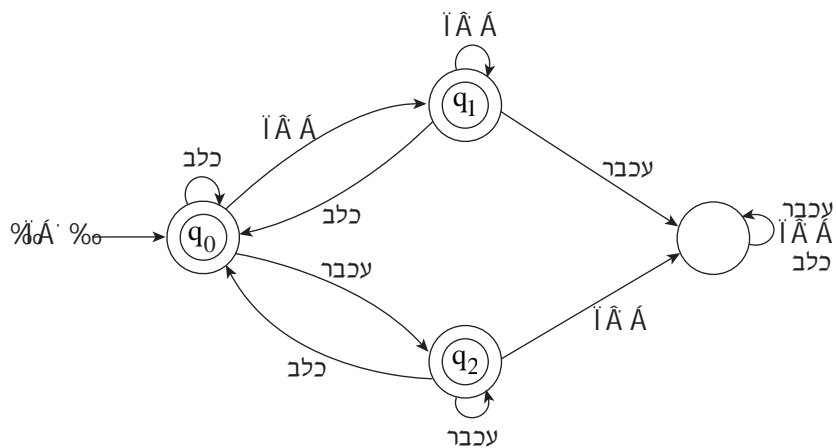
$$w_1 = caaa$$

$$w_2 = ccaaaa$$

$$w_3 = caaa$$

. L

.16



.20-17 _____ ,Java - _____) 25- (: .17

	Vehicle
	Train
	Boat
	Airplane
	TransportationCompany

```

public class Vehicle
{
    private String type;           // ) / / (
    private String way;           // )... / / / (
    private int maxSpeed;         //

    public Vehicle(String type, String way, int maxSpeed)
    {
        this.type = type;
        this.way = way;
        this.maxSpeed = maxSpeed;
    }
}

public class Train extends Vehicle
{
    private int numOfCarriages;    //

    public Train(int maxSpeed, int numOfCarriages)
    {
        super("land", "tracks", maxSpeed);
        this.numOfCarriages = numOfCarriages;
    }

    public void incNumOfCarriages(int n) // n-
    {
        this.numOfCarriages = this.numOfCarriages + n;
    }
}

/23 / ) : (
    
```

```
public class Boat extends Vehicle
{
    public Boat(String way, int maxSpeed)
    {
        super("water", way, maxSpeed);
    }
}

public class Airplane extends Vehicle
{
    private int maxHeight; //
    public Airplane(int maxSpeed, int maxHeight)
    {
        super("sky" , "air" , maxSpeed);
        this.maxHeight = maxHeight;
    }
}

public class TransportationCompany
{
    private Vehicle[] vehicles = new Vehicle[50]; //
    private int counter = 0; //
    public TransportationCompany()
    {
    }

    public void addVehicle (Vehicle v) //
    {
        // .
        this.vehicles[counter] = v;
        this.counter++;
    }
}
```

). : (

: , Program Java- .
TransportationCompany — **i**
 .company1
 .company1 **ii**

```

: TransportationCompany .
public void display()
{
    for (int i=0; i<this.counter; i++)
    {
        System.out.println((i+1) + ":" + this.vehicles[i]);
    }
}
, display() Java-

```

, inheritance — , encapsulation — (.)polymorphism —
 .display() —

n n , Java-

4 , 4- 0

(Library) (Book)
:Library - Book UML

Book	
private int code	//
private String name	//
private String genre	//)... , , (
private int numOfCopies	//) (
private int[] rating	//
...	// get - set
public void incNumOfCopies()	// 1 -
public double score()	//

Library	
private Book[] books	//
	//

) (rating

-
-
-
-

, Java -

UML -

603.899205' " ' "

- 26 -

: . 50 " ' " .19
, MP4 , MP3

- :
) / (, , , : MP3 •
-) / (, , , : MP4 •
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limit ,
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limit ,

). : (

polymorphism — , inheritance — , encapsulation — (

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, Java - ,

, Java - ,

)set (

)get (

.Program- , Derived3 , Derived2 , Derived1 , Base , .20

```

public class Base
{
    protected int num;
    public Base (int n)
    {
        this.num = n;
    }
    protected void doSomeWork()
    {
        System.out.println("num = " + this.num);
    }
    public void run()
    {
        if (this.num%2 == 0)
            doSomeWork();
    }
}

public class Derived1 extends Base
{
    private int num1;
    public Derived1(int n , int n1)
    {
        super (n);
        this.num1 = n1;
    }

    protected void doSomeWork()
    {
        multiplication();
    }

    public void multiplication()
    {
        super.doSomeWork();
        System.out.println("num1 = " + this.num1);
        System.out.println("num * num1 = " + this.num * this.num1);
    }
}

```

```
public class Derived2 extends Base
{
    private int num2;

    public Derived2(int n , int n2)
    {
        super (n);
        this.num2 = n2;
    }

    protected void doSomeWork()
    {
        division();
    }

    public void division ()
    {
        super.doSomeWork();
        System.out.println("num2 = " + this.num2);
        System.out.println("num / num2 = " + this.num / this.num2);
    }
}
```

```
public class Derived3 extends Base
{
    private int num3;

    public Derived3(int n, int n3)
    {
        super (n);
        this.num3 = n3;
    }

    protected void doSomeWork()
    {
        multiplication();
        division();
    }

    public void multiplication()
    {
        super.doSomeWork();
        System.out.println("num3 = " + this.num3);
        System.out.println("num * num3 = " + this.num * this.num3);
    }
}
```

```
public void division()
{
    super.doSomeWork();
    System.out.println("num3 = " + this.num3);
    System.out.println("num / num3 = " + this.num / this.num3);
}
}
```

```
public class Program
{
    public static void main(string[] args)
    {
        Base[] arr = new Base[5];
        arr[0] = new Derived1(12 , 22);
        arr[1] = new Derived2(33 , 44);
        arr[2] = new Derived3(54 , 34);
        arr[3] = new Derived1(51 , 72);
        arr[4] = new Derived2(58 , 99);

        for (int i = 0; i < arr.length; i++)
            arr[i].run();

        if (arr[2] instanceof Derived3)
        {
            arr[2].run();
        }

        if (arr[3] instanceof Derived2)
        {
            arr[3].run();
        }
    }
}
```

Program main

.24-21 _____ ,C# - _____) 25- (: .21

	Vehicle
	Train
	Boat
	Airplane
	TransportationCompany

```

public class Vehicle
{
    private string type;           // ) / / (
    private string way;           // )... / / / (
    private int maxSpeed;        //

    public Vehicle(string type, string way, int maxSpeed)
    {
        this.type = type;
        this.way = way;
        this.maxSpeed = maxSpeed;
    }
}

public class Train : Vehicle
{
    private int numOfCarriages;    //

    public Train(int maxSpeed, int numOfCarriages) : base("land", "tracks",maxSpeed)
    {
        this.numOfCarriages = numOfCarriages;
    }

    public void IncNumOfCarriages(int n) // n-
    {
        this.numOfCarriages = this.numOfCarriages + n;
    }
}

/32 / ) : (
    
```

```
public class Boat : Vehicle
{
    public Boat(String way, int maxSpeed) : base("water", way, maxSpeed)
    {
    }
}

public class Airplane : Vehicle
{
    private int maxHeight; //
    public Airplane(int maxSpeed, int maxHeight) : base("sky", "air", maxSpeed)
    {
        this.maxHeight = maxHeight;
    }
}

public class TransportationCompany
{
    private Vehicle[] vehicles = new Vehicle[50]; //
    private int counter = 0; //
    public TransportationCompany()
    {
    }

    public void AddVehicle (Vehicle v) //
    {
        // .
        this.vehicles[counter] = v;
        this.counter++;
    }
}
```

). : (

```

:
TransportationCompany —
        .company1
        .company1

```

Program C# - i
ii

```

:
TransportationCompany
public void Display()
{
    for (int i=0; i<this.counter; i++)
    {
        Console.WriteLine((i+1) + ":" + this.vehicles[i]);
    }
}
, Display() C#-

```

, inheritance — , encapsulation — ()polymorphism —

.Display() —

n n , C#-

4 , 4- 0

(Library)

(Book)

:Library - Book

UML

Book	
private int code	//
private String name	//
private String genre	//)... , , (
private int numOfCopies	//) (
private int[] rating	//
...	// Get - Set
public void IncNumOfCopies()	// 1 -
public double Score()	//

Library	
private Book[] books	//
	//

) (rating

-
-
-
-

, C#-

UML -

603.899205' " ' "

- 35 -

: . 50 " ' " .23

, MP4 , MP3

- :
) / (, , , : MP3 •
-) / (, , , : MP4 •
-) / (, , , : •

,
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 :
 ,
 limit ,
 :
 ,
 limit ,

) . : (

)polymorphism — , inheritance — , encapsulation — (

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, C#-

, C#-

)Set (

)Get (

. Program- , Derived3 , Derived2 , Derived1 , Base ,

.24

```

public class Base
{
    protected int num;
    public Base (int n)
    {
        this.num = n;
    }
    protected virtual void DoSomeWork()
    {
        Console.WriteLine("num = " + this.num);
    }
    public void Run()
    {
        if (this.num%2 == 0)
            DoSomeWork();
    }
}

public class Derived1 : Base
{
    private int num1;
    public Derived1(int n , int n1) : base(n)
    {
        this.num1 = n1;
    }

    protected override void DoSomeWork()
    {
        Multiplication();
    }

    public void Multiplication()
    {
        Base.DoSomeWork();
        Console.WriteLine("num1 = " + this.num1);
        Console.WriteLine("num * num1 = " + this.num * this.num1);
    }
}

```

```
public class Derived2 : Base
{
    private int num2;

    public Derived2(int n , int n2) : base(n)
    {
        this.num2 = n2;
    }

    protected override void DoSomeWork()
    {
        Division();
    }

    public void Division ()
    {
        Base.DoSomeWork();
        Console.WriteLine("num2 = " + this.num2);
        Console.WriteLine("num / num2 = " + this.num / this.num2);
    }
}
```

```
public class Derived3 : Base
{
    private int num3;

    public Derived3(int n, int n3) : base(n)
    {
        this.num3 = n3;
    }

    protected override void DoSomeWork()
    {
        Multiplication();
        Division();
    }

    public void Multiplication()
    {
        Base.DoSomeWork();
        Console.WriteLine("num3 = " + this.num3);
        Console.WriteLine("num * num3 = " + this.num * this.num3);
    }
}
```

). : (

```
public void Division()
{
    Base.DoSomeWork();
    Console.WriteLine("num3 = " + this.num3);
    Console.WriteLine("num / num3 = " + this.num / this.num3);
}

public class Program
{
    public static void Main(string[] args)
    {
        Base[] arr = new Base[5];
        arr[0] = new Derived1(12 , 22);
        arr[1] = new Derived2(33 , 44);
        arr[2] = new Derived3(54 , 34);
        arr[3] = new Derived1(51 , 72);
        arr[4] = new Derived2(58 , 99);

        for (int i = 0; i < arr.Length; i++)
            arr[i].Run();

        if (arr[2] is Derived3)
        {
            arr[2].Run();
        }

        if (arr[3] is Derived2)
        {
            arr[3].Run();
        }
    }
}
```

Program Main

!