Stack (3A)

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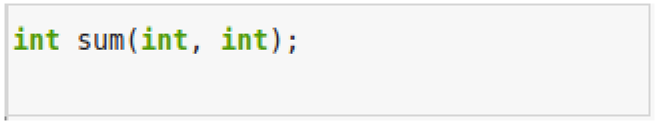
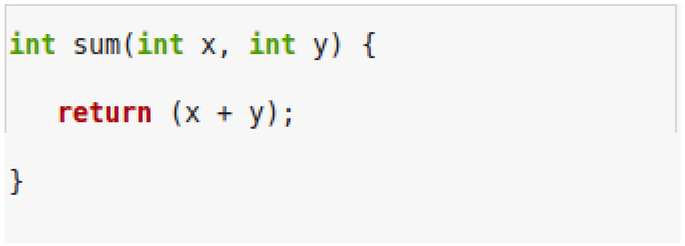
4/17/15

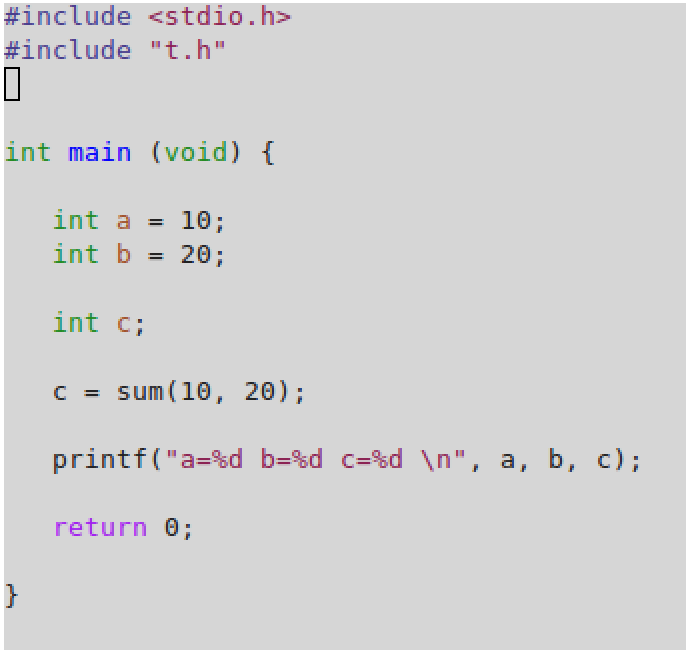
Separate Compile



```c
int sum(int, int);
```

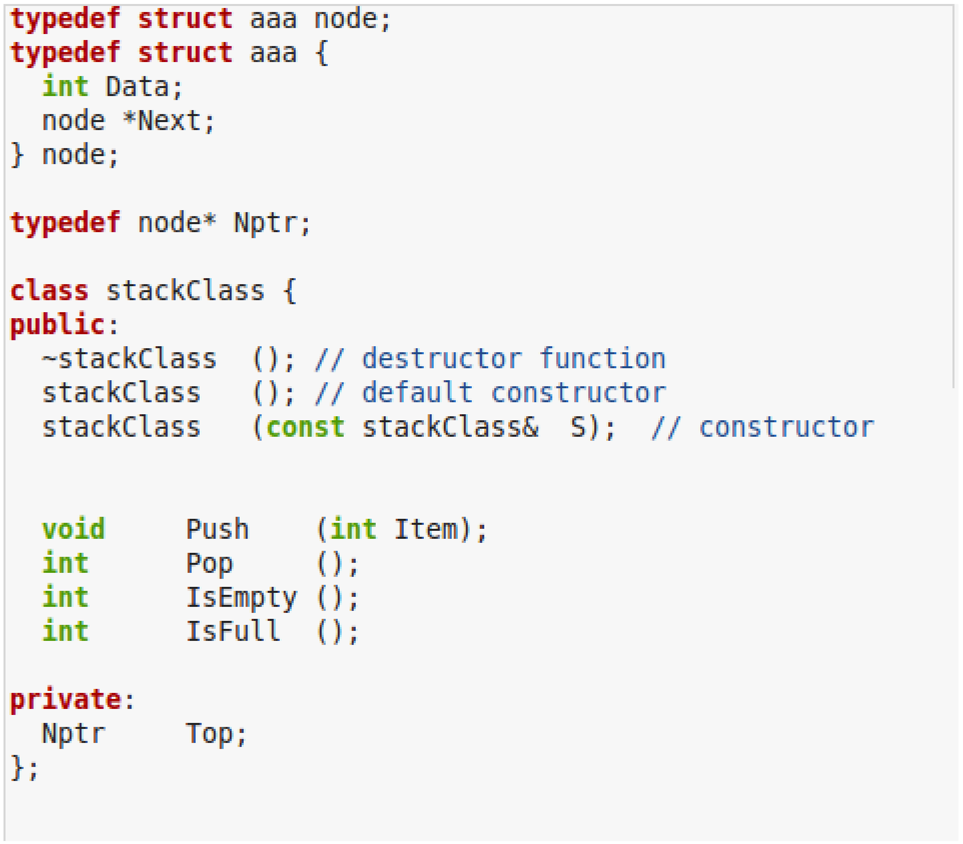


```c
int sum(int x, int y) {

   return (x + y);

}
```



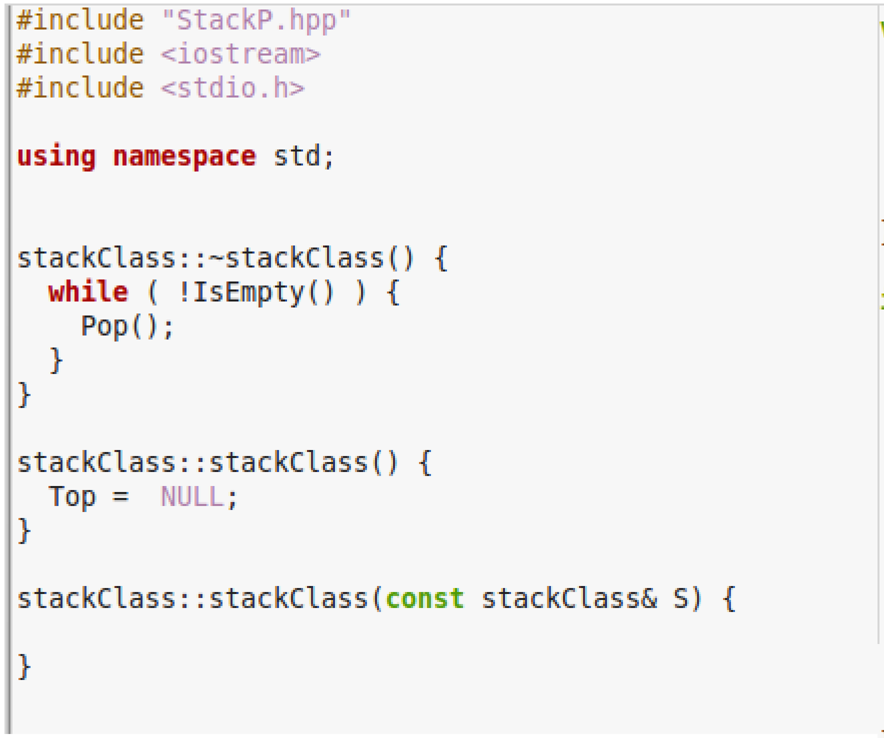
```c
#include <stdio.h>
#include "t.h"


int main (void) {

   int a = 10;
   int b = 20;

   int c;

   c = sum(10, 20);

   printf("a=%d b=%d c=%d \n", a, b, c);

   return 0;

}
```

Stack API

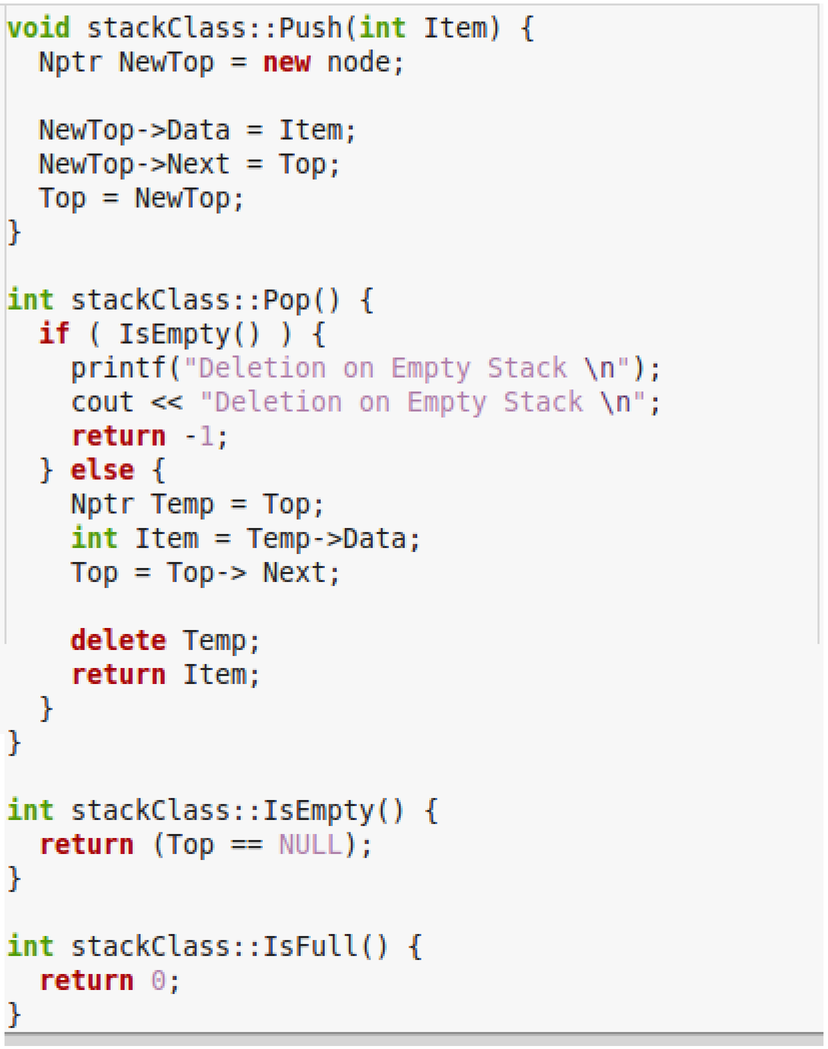


```
typedef struct aaa node;
typedef struct aaa {
  int Data;
  node *Next;
} node;

typedef node* Nptr;

class stackClass {
public:
  ~stackClass  (); // destructor function
  stackClass   (); // default constructor
  stackClass   (const stackClass&  S);  // constructor


  void     Push    (int Item);
  int      Pop     ();
  int      IsEmpty ();
  int      IsFull  ();

private:
  Nptr     Top;
};
```

Stack Implementation

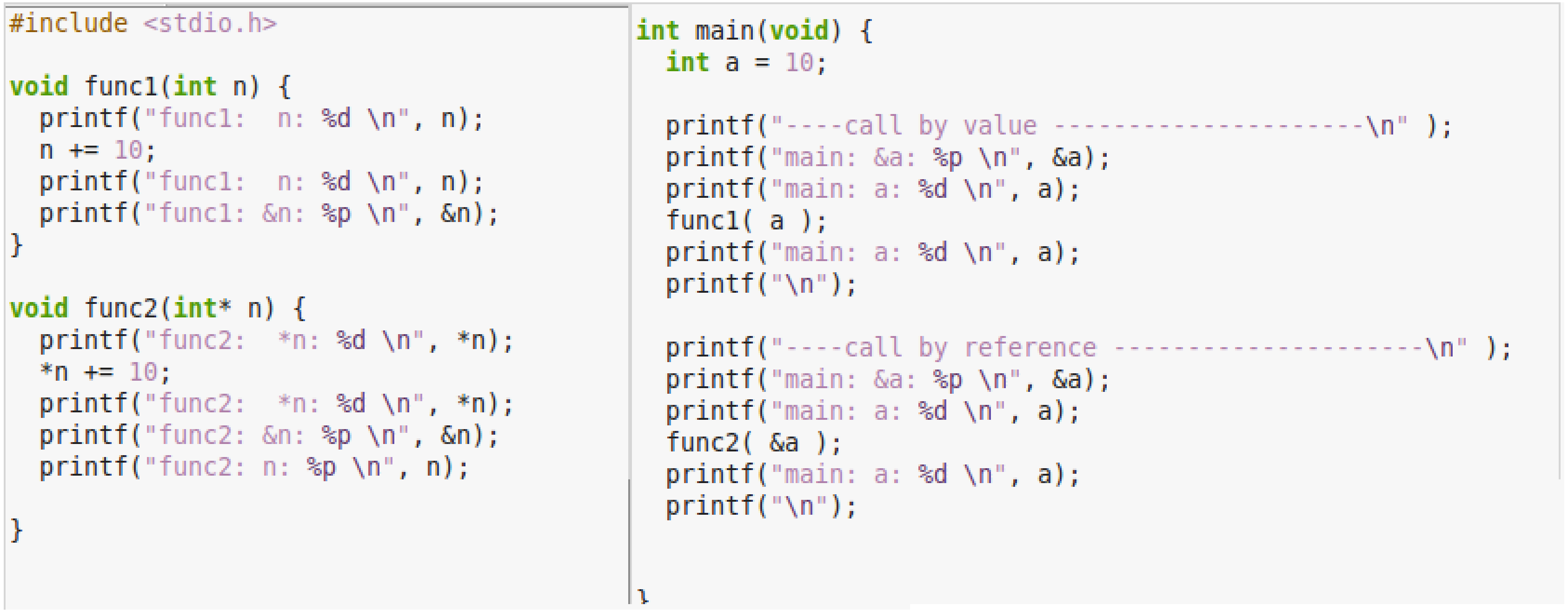


```
#include "StackP.hpp"
#include <iostream>
#include <stdio.h>

using namespace std;


stackClass::~stackClass() {
  while ( !IsEmpty() ) {
    Pop();
  }
}

stackClass::stackClass() {
  Top =  NULL;
}

stackClass::stackClass(const stackClass& S) {

}
```



```
void stackClass::Push(int Item) {
  Nptr NewTop = new node;

  NewTop->Data = Item;
  NewTop->Next = Top;
  Top = NewTop;
}

int stackClass::Pop() {
  if ( IsEmpty() ) {
    printf("Deletion on Empty Stack \n");
    cout << "Deletion on Empty Stack \n";
    return -1;
  } else {
    Nptr Temp = Top;
    int Item = Temp->Data;
    Top = Top-> Next;

    delete Temp;
    return Item;
  }
}

int stackClass::IsEmpty() {
  return (Top == NULL);
}

int stackClass::IsFull() {
  return 0;
}
```

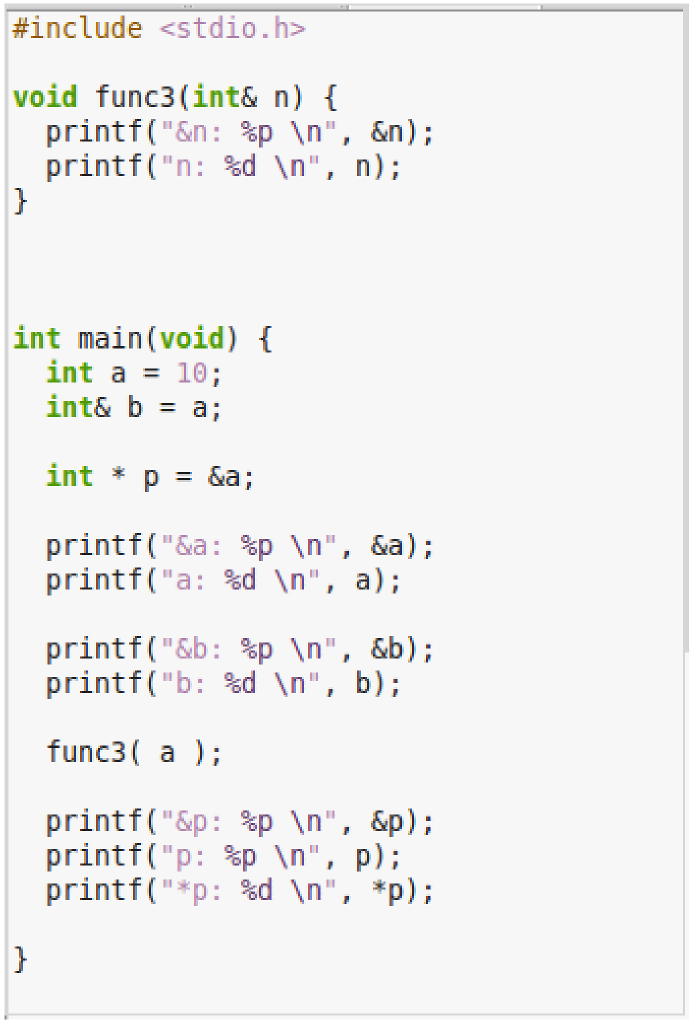
Function Calls (1)



```
#include <stdio.h>

void func1(int n) {
  printf("func1:  n: %d \n", n);
  n += 10;
  printf("func1:  n: %d \n", n);
  printf("func1: &n: %p \n", &n);
}

void func2(int* n) {
  printf("func2:  *n: %d \n", *n);
  *n += 10;
  printf("func2:  *n: %d \n", *n);
  printf("func2: &n: %p \n", &n);
  printf("func2: n: %p \n", n);

}
```

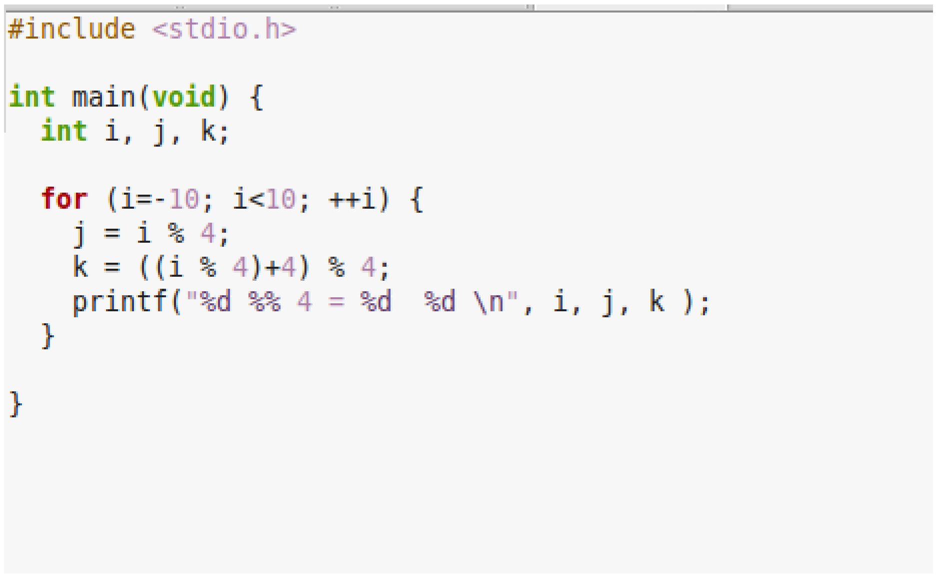
```
int main(void) {
  int a = 10;

  printf("----call by value ---------------------\n" );
  printf("main: &a: %p \n", &a);
  printf("main: a: %d \n", a);
  func1( a );
  printf("main: a: %d \n", a);
  printf("\n");

  printf("----call by reference --------------------\n" );
  printf("main: &a: %p \n", &a);
  printf("main: a: %d \n", a);
  func2( &a );
  printf("main: a: %d \n", a);
  printf("\n");


}
```

Function Calls (2)



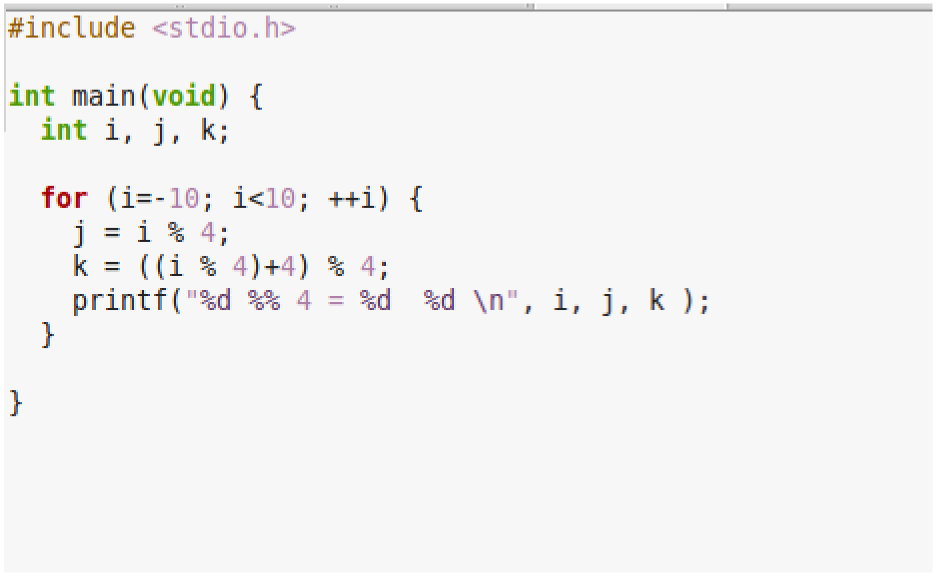
```
#include <stdio.h>

void func3(int& n) {
  printf("&n: %p \n", &n);
  printf("n: %d \n", n);
}



int main(void) {
  int a = 10;
  int& b = a;

  int * p = &a;

  printf("&a: %p \n", &a);
  printf("a: %d \n", a);

  printf("&b: %p \n", &b);
  printf("b: %d \n", b);

  func3( a );

  printf("&p: %p \n", &p);
  printf("p: %p \n", p);
  printf("*p: %d \n", *p);

}
```

Modulo



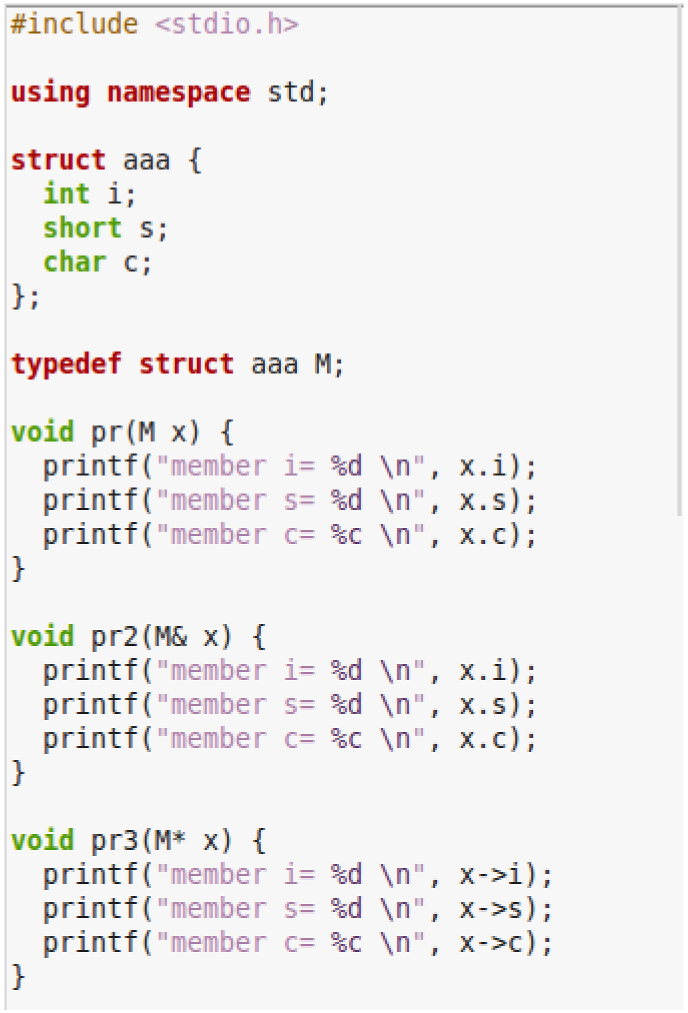
```
#include <stdio.h>

int main(void) {
  int i, j, k;

  for (i=-10; i<10; ++i) {
    j = i % 4;
    k = ((i % 4)+4) % 4;
    printf("%d %% 4 = %d  %d \n", i, j, k );
  }

}
```

Dynamic Memory Allocation

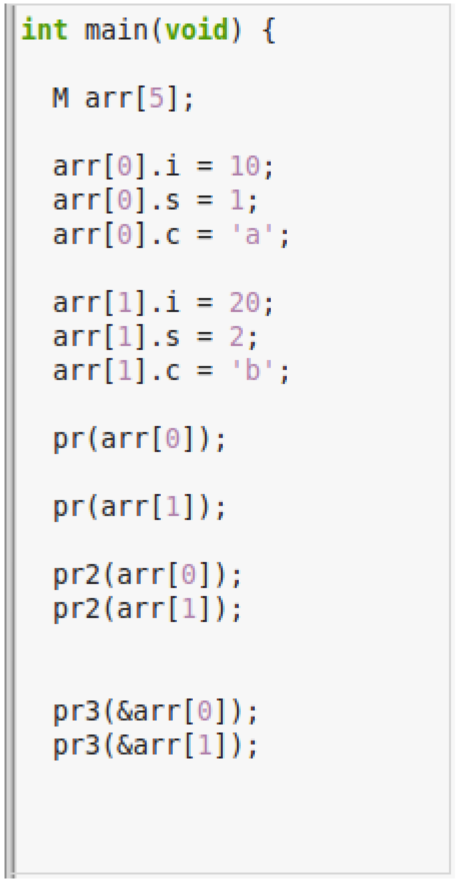


```
#include <stdio.h>

int main(void) {
  int i, j, k;

  for (i=-10; i<10; ++i) {
    j = i % 4;
    k = ((i % 4)+4) % 4;
    printf("%d %% 4 = %d  %d \n", i, j, k );
  }

}
```

Array of Structure



```
#include <stdio.h>

using namespace std;

struct aaa {
  int i;
  short s;
  char c;
};

typedef struct aaa M;

void pr(M x) {
  printf("member i= %d \n", x.i);
  printf("member s= %d \n", x.s);
  printf("member c= %c \n", x.c);
}

void pr2(M& x) {
  printf("member i= %d \n", x.i);
  printf("member s= %d \n", x.s);
  printf("member c= %c \n", x.c);
}

void pr3(M* x) {
  printf("member i= %d \n", x->i);
  printf("member s= %d \n", x->s);
  printf("member c= %c \n", x->c);
}
```



```
int main(void) {

  M arr[5];

  arr[0].i = 10;
  arr[0].s = 1;
  arr[0].c = 'a';

  arr[1].i = 20;
  arr[1].s = 2;
  arr[1].c = 'b';

  pr(arr[0]);

  pr(arr[1]);

  pr2(arr[0]);
  pr2(arr[1]);


  pr3(&arr[0]);
  pr3(&arr[1]);
```

Stack Implementation

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References

[1] http://en.wikipedia.org/
[2]