

Void Pointer

Eike Ritter
School of Computer Science
University of Birmingham

Void pointer

- A void pointer in C has no associated data type.
- It can store the address of any type of object
- '*Generic pointer*'
- It can be type-casted to any types.

Syntax for declaration

```
void *pointer_name;
```

Void pointer and reusability

- Most important feature of the void pointer is reusability.
- We can store the address of **any** object
- Whenever required we can typecast it to a required type

Void pointer example

```
int main()
{
    void *pv;
    int iData = 5;
    char cData = 'C';

    //Pointer to char
    pv = &cData;

    //Dereferencing void pointer with char typecasting
    printf("cData = %c\n\n",*((char*)pv));

    //Pointer to int
    pv = &iData;

    //Dereferencing void pointer with int typecasting
    printf("iData = %d\n\n",*((int *)pv));

    return 0;
}
```

The same pointer is reused for multiple data types.
Type must be specified while dereferencing.

Arithmetic on void pointer

```
#include<stdio.h>

int main()
{
    int a[4] = {1, 5, 13, 4};
    void *pv = &a[0];
    pv = pv + 1;

    printf("Value %d\n", *((int *) pv));
}

return 0;
```

What will be the output?

Arithmetic on void pointer

```
#include<stdio.h>

int main()
{
    int a[4] = {1, 5, 13, 4};
    void *pv = &a[0];
    pv = pv + 1;

    printf("Value %d\n", *((int *) pv) );

    return 0;
}
```

What will be the output?

It will not print 5

pv+1 does not increment pv by scale_factor=4

Arithmetic on void pointer

Perform proper typecasting on the void pointer before performing arithmetic operation.

```
#include<stdio.h>

int main()
{
    int a[4] = {1, 5, 13, 4};
    void *pv = &a[0];
    pv = (int *) pv + 1;

    printf("Value %d\n", *((int *) pv));
}

return 0;
```

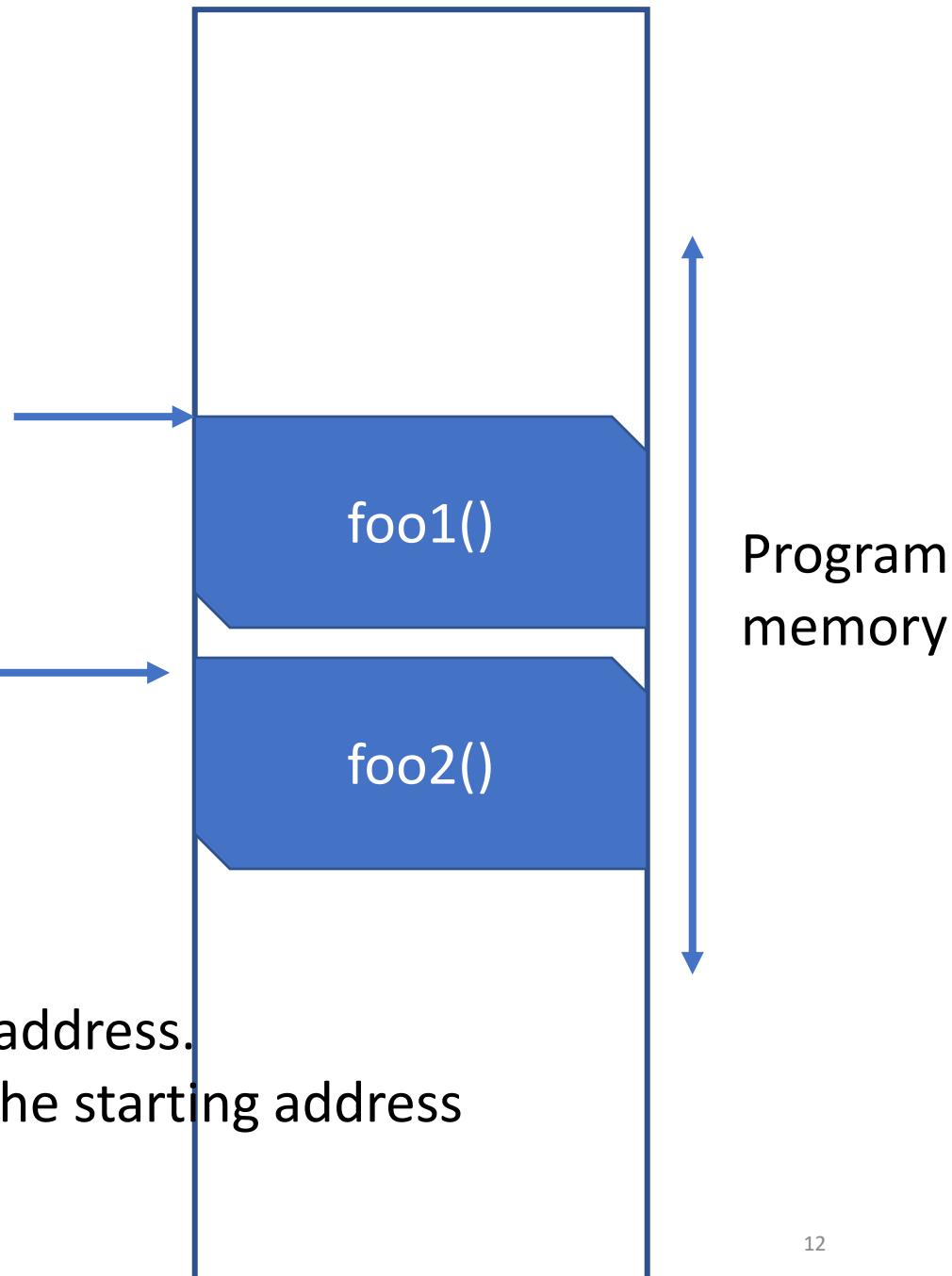
Now it prints 5

During `pv+1` compiler increments `pv` by scale_factor=4

Function pointers

Start address of foo1()

Start address of foo2()



- Every function has a memory address.
- A pointer to a function holds the starting address

Function pointer syntax

Syntax for declaration

```
int (*foo)(int);
```

- foo is a pointer to a function
- Where function takes one int argument and returns int.

foo

```
int negate(int a);
int square(int c);
...
```

Foo can point to any of these functions

Function pointer syntax: careful

Function pointer declaration

```
int (*foo)(int);
```

Here function returns pointer of type int

```
int *foo(int);
```

To declare a function pointer () must be used

Function pointer syntax

What is the meaning of this syntax?

```
int * (*foo) (int);
```

- foo is a pointer to a function
- Where function takes one int argument and **returns pointer to int.**

foo

```
int *negate(int a);
int *square(int c);
...
```

Foo can point to any of these functions

Initialization of function pointer

```
void int_func(int a)
{
    printf("%d\n", a);
}

int main()
{
    void (*foo)(int);

        // & is optional
    foo = &int_func;

    return 0;
}
```

Calling function using function pointer

```
void int_func(int a)
{
    printf("%d\n", a);
}

int main()
{
    void (*foo)(int);

    // & is optional
    foo = &int_func;
    // two ways to call
    foo(2);
    (*foo)(3);
    return 0;
}
```