

COMP10002 Foundations of Algorithms

Workshop Week4

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GitHub Repo: <https://github.com/AlanChaw/COMP10002-FoA>

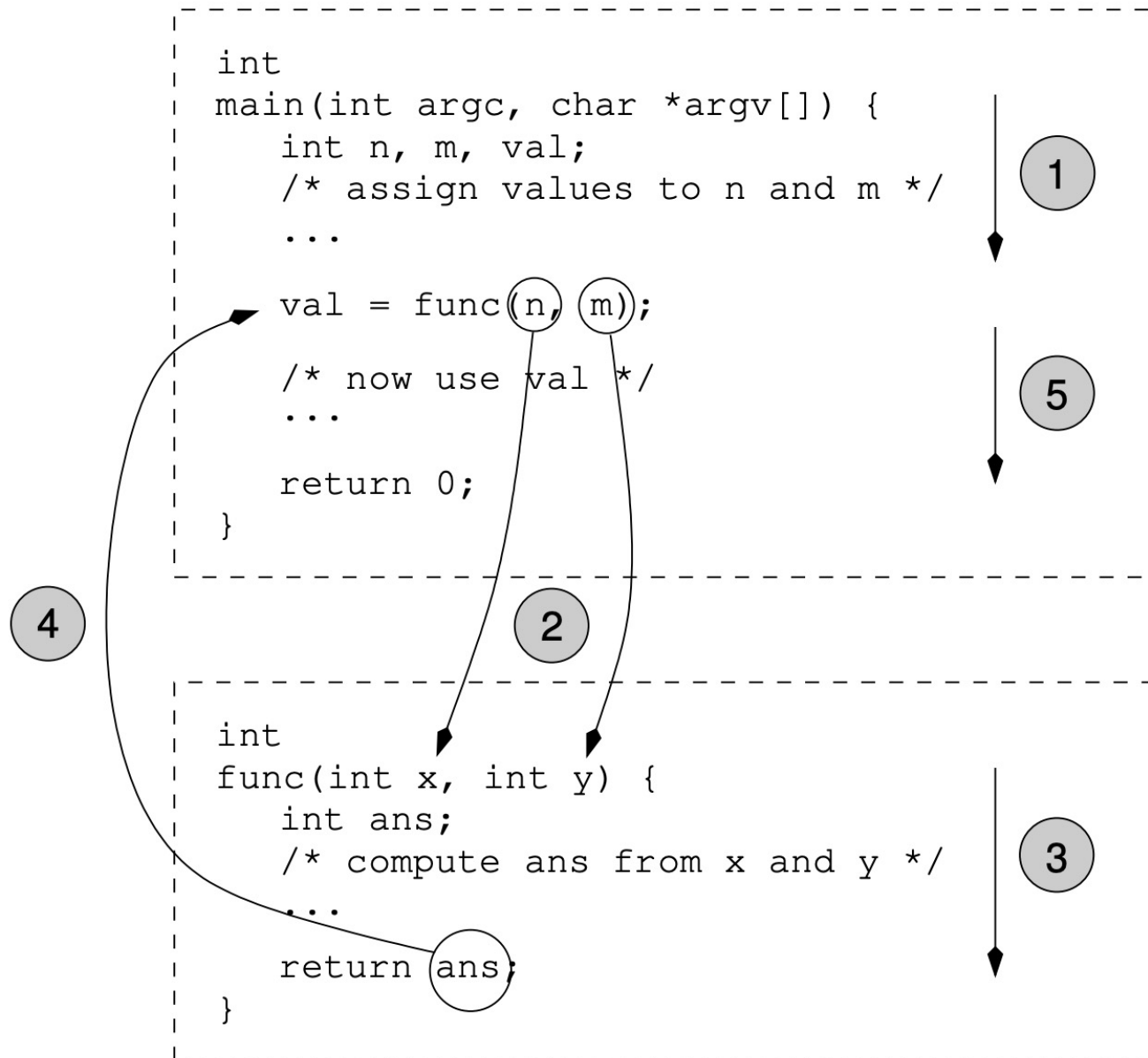
Recap

Functions

Pointer

Array

Functions



Functions

Declaration and Defination

Arguments and Parameters

Recursion

Use of void

```
void printHello(void){  
    printf("hello\n");  
}  
  
int main(){  
    printHello();  
    printHello();  
    printHello();  
    return 0;  
}
```

Output:

```
hello  
hello  
hello
```

Pointers

Scope Problem

- Changing the local variable in a function will not change the outside argument

```
void func(int x){  
    x++;  
}  
  
int main(){  
    int x = 1;  
    func(x);  
    printf("%d\n", x);  
    return 0;  
}
```

- Functions cannot use the local variables of other functions

Discussion

Exercise 6.2

For each point, write down a list of all of the program-declared variables and functions that are in scope at that point (and the type for each identifier).

Pointers and pointer operations

- Pointer: Stores the memory address of another variable

```
int main(){
    int a = 3;
    int* p = &a;  //p is a pointer to int

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

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

    return 0;
}
```

Output:

```
3
0x7ffeefbfff5b8
3
0x7ffeefbfff5b8
```


Pointer is like an "alias" of the variable

```
int main(){  
    int a = 3;  
    int* p = &a;  
  
    *p = *p + 1;  
  
    printf("%d\n", a);  
    printf("%d\n", *p);  
  
    return 0;  
}
```

Pointers as arguments (Call by Reference)

```
void swap(int *p1, int *p2){  
    int tmp;  
    tmp = *p1;  
    *p1 = *p2;  
    *p2 = tmp;  
}  
  
int main(){  
    int x = 2, y = 3;  
    swap(&x, &y);  
    printf("after swap: x=%d, y=%d\n", x, y);  
}
```

Further Example

```
void myfunc(int *pointer){
    *pointer = *pointer + 1;

    int b = 10;
    pointer = &b;
    *pointer = *pointer + 1;
}

int main(){
    int a = 3;
    int* p = &a;

    printf("Before pass to function: %d\n", a);
    myfunc(p);
    printf("After executed of function: %d\n", a);
    printf("After executed of function: %d\n", *p);

    return 0;
}
```

Array

Dicsussion - Exercise 7.3

Modify the program of Figure 7.3 on page 104 so that after the array has been sorted only the distinct values are retained in the array (with variable n suitably reduced)

Hands on exercise

Exercise 6.9

- Try to solve this question step by step
 - Copy, paste, read through, and run the program for **Exercise 3.6**
 - Add **try_one_coin()** function, and test
 - Add **print_change()** function, and test
 - Add **round_to_5()** function, and test
 - Write a **loop** to iterate the input from 1 to 1000 (\$10)

Exercise 7.4