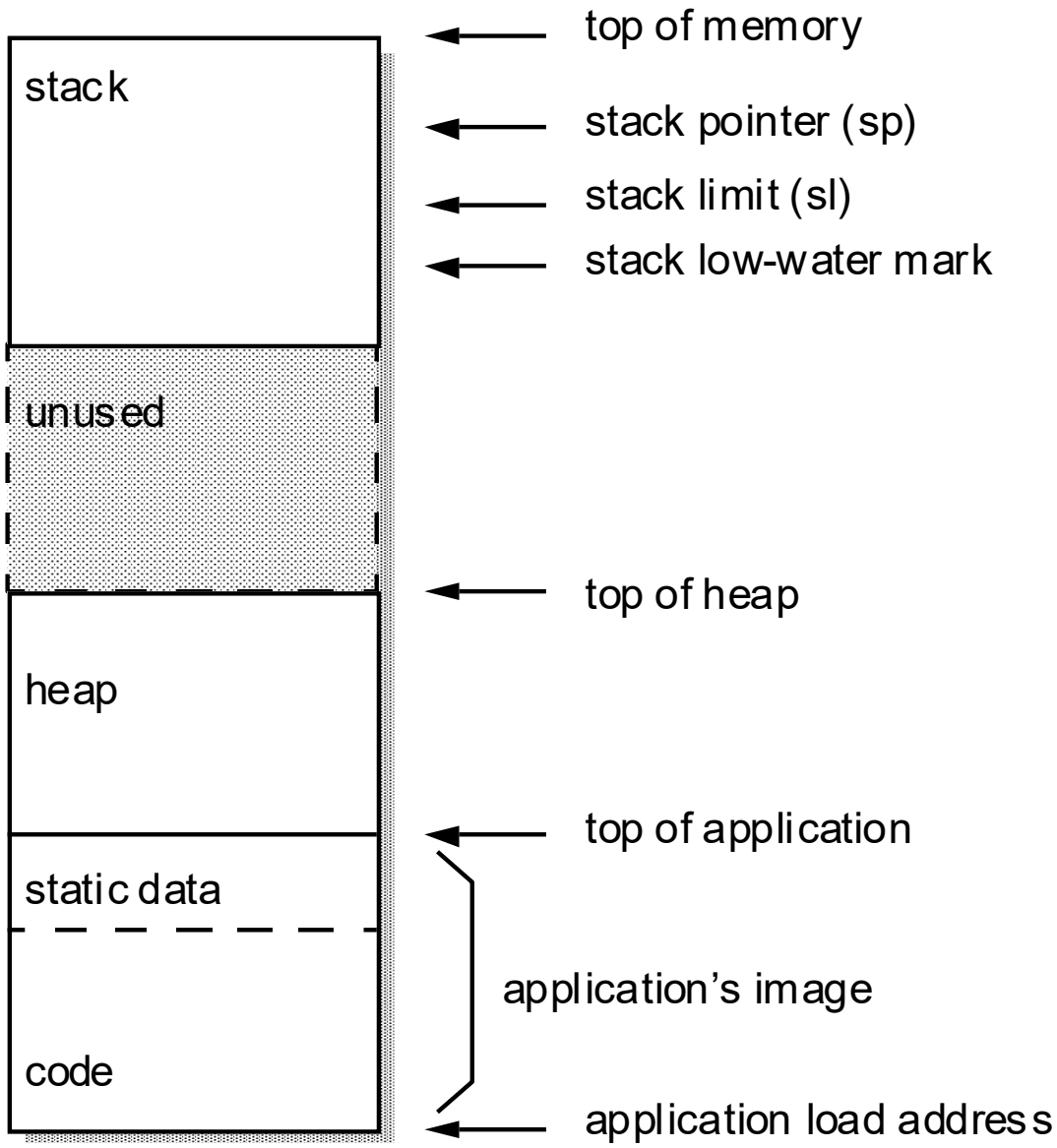
Homework #5 (1)

- Write a function called **NumSort** to sort an integer array from the biggest to the smallest.
- Two arguments will be passed into your function by stack
  - **Array size**
  - **The address of the first element in array**
- **The result of NumSort**
  - The result array in which each element is sorted from the biggest to the smallest. (原來的integer array裡的沒有被修改，只是讀取原integer array，並排序好的結果存放於result array)
  - Register r0 will have the address of the result array.

Homework #5 (2)

- Ex: an integer array=[1,10,6,3,20,40,9]
  - Result: **40, 20, 10, 9, 6, 3, 1**

- Ex: an integer array=[12,4,2,45,23,8,50,67]
  - Result: **67, 50, 45, 23, 12, 8, 4, 2**


top of memory
stack
stack pointer (sp)
stack limit (sl)
stack low-water mark
unused
top of heap
heap
top of application
static data
application's image
code
application load address

A C program using your procedure demos your sorting algorithm.

hw5_test.c

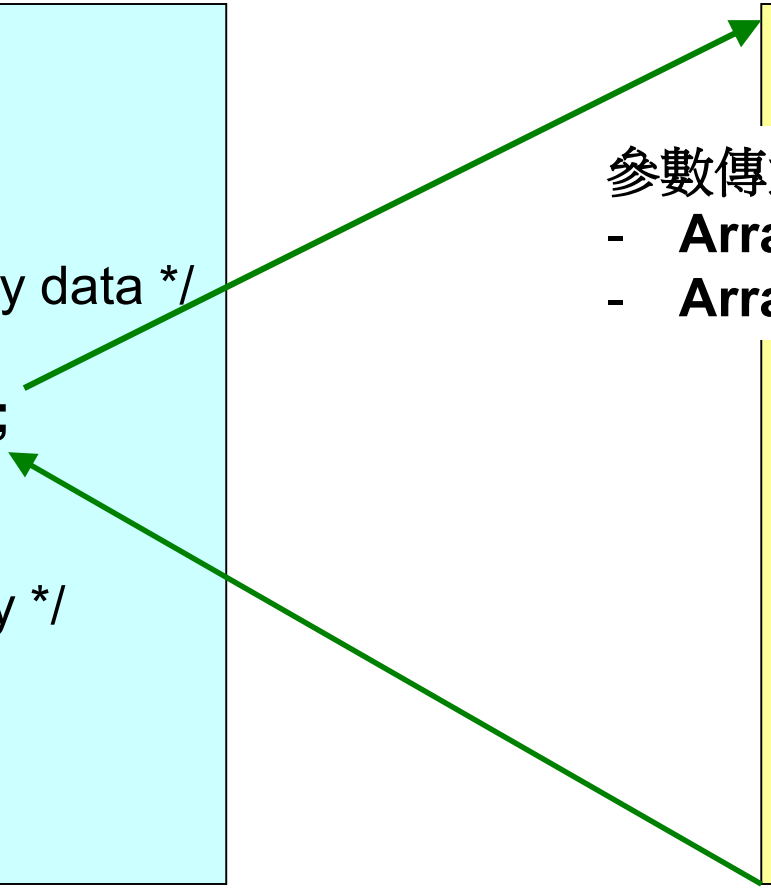
```
#include <stdio.h>
int main()
{
    /* prepare your array data */
    …
    … = NumSort( … );
    …

    /* output result array */
    printf( … );
    return 0;
}
```

numsort.s

參數傳遞

- **Array size**
- **Array address**

NumSort



Homework #5 (3)

numsort.s

```
        .section .text
        .global NumSort
        .type NumSort,%function

NumSort:
        /* function start */
        MOV ip, sp
        STMFD sp!, {r0-r10, fp, ip, lr, pc}
        SUB fp, ip, #4

        /* --- begin your function --- */
        /* put array size into r0 */
        /* put array address into r1 */

        /* DO NumSort */

        /* --- end of your function --- */

        /* function exit */
        LDMEA fp, {r0-r10, fp, sp, pc}
        .end
```

參數傳遞

Write your function

How to Compile Your Program?

- $arm-none-eabi-gcc –g hw5_test.c numsort.s –o hw5.exe

Homework #5 (4)

- Program should be assembled and linked by gcc
  - 使用於作業一所安裝完成的cross toolchain.
- Program should be executed under **GDB ARM simulator**
- 程式中應有適當的說明（註解）
- You should turn in to **ECOURSE2**
  - "**README.txt**" file: 文字檔，描述你程式的內容、如何編譯程式、如何執行你的程式
  - Your ARM assembly procedure，**檔名為：numsort.s**
  - A C program which uses your NumSort procedure，**檔名為：hw5_test.c**
  - Makefile / any file needed in your work
  - 請將欲繳交的檔案壓縮成 <**hw5_學號.tar.bz2**>，上傳壓縮檔
- **Deadline: November 30 (Monday), 2020**