WORKSHOP 3

Memory Location for Variables

CSX3004 Programming Languages

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ACTIVITY: MEMORY LOCATION FOR VARIABLES

Goal: To identify where the variables are stored in the memory.

Time Limit: 60 minutes

TASK 1: CODE ANALYSIS

Consider the following C program.

```
int counter = 10;

void foo() {
    int x = 5;
    int *p = malloc(sizeof(int));
    *p = 20;
}

int main() {
    foo();
    return 0;
}
```

1. Identify where each variable i.e., counter, x, p and the integer pointed to by p is stored (stack, heap, static).
2. When is the memory block allocated and deallocated for each variable?
3. What happens if free(p) is not called before foo() ends?

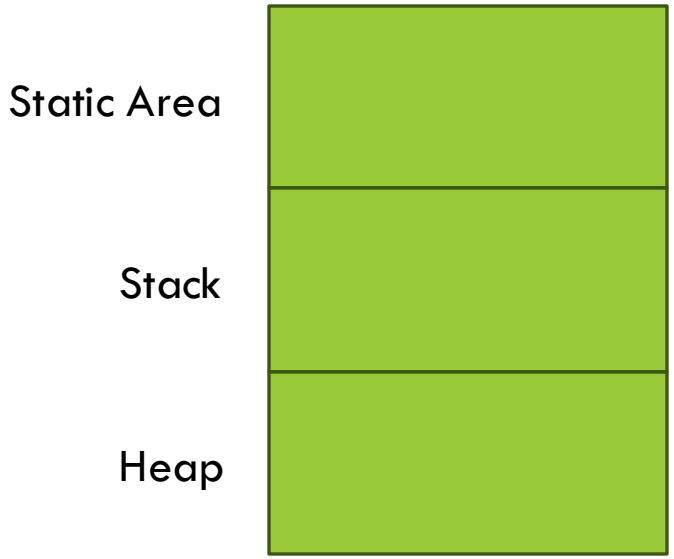
TASK 2: MEMORY LAYOUT DIAGRAM

Given the following memory layout and the code given below, indicate where each variable resides during the call to foo().

```
int counter = 10;

void foo() {
   int x = 5;
   int *p = malloc(sizeof(int));
   *p = 20;
}

int main() {
   foo();
   return 0;
}
```



TASK 3: DISCUSSION

1. Why do local variables disappear after a function ends?
2. How is memory management in Python or ML different from C?