CSC209H Worksheet: Strings

1. Write a program that creates 3 variables with string values. The first named `first` should be set to the value `"Monday"`, and be a char array stored on the stack frame for `main`. `second` should be a string literal with the value `"Tuesday"`. `third` should have value `"Wednesday"`, whose characters are stored on the heap. `second` and `third` should be pointers, with space allocated for the pointers in stack frame for `main`. Then beside your code, draw the memory model for your program after all three strings have been created.

```
int main()
```

```
char first[] = "Monday";
char *second = "Tuesday";
char *third = malloc(10);
strncpy(third, "Wednesday", 10);
```

Section	Address	Value	Label
Read-only	0x100	M onc|	
	0x104	ay \0	
	0x108	T ues	
	0x10c	day \0	
	0x110	We d n	
	⋮	e s|d a	
Heap	0x23c	Wed n	
	0x240	es d a	
	0x244	y \0	
	⋮	⋮	
Stack	0x450	M o n d	first
	0x454	a y \0	
	0x458	0x108	second
	0x45c		
	0x460	0x23c	third
	0x464		
	0x468		
	0x46c		
	0x470		
	0x474		
	0x478		
	0x47c		

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2. Add to your program so that it declares an array `string_list` of 3 pointers to char and set the elements to `first`, `second`, and `third`, respectively. So now you have an array of strings. Where is the memory allocated for this array? Add to your memory model diagram as well. Once you have this complete, check your work against the code on the next page, which has solutions to questions 1 and 2 and a place to answer question 3.

3. Now, add a new function `build_month_list` that allocates, initializes and returns an array of 3 strings with the values `"January"`, `"February"`, and `"March"`. All the strings need to be mutable, so that the `main` function can shorten them. Remember to uncomment the code in `main` that tests the return value of `build_month_list`.

4. If you are finished (or if you can't figure out why your code isn't working), draw a memory diagram illustrating your program at the moment just before `build_month_list` returns.

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```
#include <stdio.h>
#include <stdlib.h>
#include <string.h>

// Part 3: Implement build_month_list.









int main() {
    // Part 1: Declare and initialize first, second, and third.
    char first[7] = "Monday";
    char *second = "Tuesday";
    char *third = malloc(10 * sizeof(char));
    // third = "Wednesday";  <- DOES NOT WORK make sure you understand why!
    strcpy(third, "Wednesday");

    printf("%s %s %s\n", first, second, third);

    // Part 2: Declare and initialize string_list.
    char *string_list[3];
    string_list[0] = first;
    string_list[1] = second;
    string_list[2] = third;

    printf("%s %s %s\n", string_list[0], string_list[1], string_list[2]);

    char **months = build_month_list();
    for (int i = 0; i < 3; i++) {
        printf("%s ", months[i]);
    }
    printf("\n");

    for (int i = 0; i < 3; i++) {
        months[i][3] = '\0';
        printf("%s ", months[i]);
    }
    printf("\n");

    return 0;
}
```