Demonstration of safe string copying in C using `strncpy()`

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

int main() {
    char s1[] = "computer security is fun";
    char s2[15] = "";
    char s3[10] = "";

    printf("Before strncpy operations...\n");
    printf("s1: \"%s\" size: %zu length: %zu\n", s1, sizeof(s1), strlen(s1));
    printf("s2: \"%s\" size: %zu length: %zu\n", s2, sizeof(s2), strlen(s2));
    printf("s3: \"%s\" size: %zu length: %zu\n", s3, sizeof(s3), strlen(s3));

    strncpy(s2,s1,sizeof(s2)-1);
    s2[sizeof(s2)-1] = '\0';      // manually null-terminate to be safe
    strncpy(s3,s1,sizeof(s3)-1);
    s3[sizeof(s3)-1] = '\0';

    printf("After strncpy operations...\n");
    printf("s1: \"%s\" size: %zu length: %zu\n", s1, sizeof(s1), strlen(s1));
    printf("s2: \"%s\" size: %zu length: %zu\n", s2, sizeof(s2), strlen(s2));
    printf("s3: \"%s\" size: %zu length: %zu\n", s3, sizeof(s3), strlen(s3));
}
```

Let's assume the storage for arrays s1, s2, and s3 are allocated in the order of declarations in the source code (high memory address to low memory address).

Step 1: Show the stack frame contents BEFORE call to `strncpy` function (left table on next page)

Step 2: Use the before call stack frame contents to determine the output produced by the first three print statements.
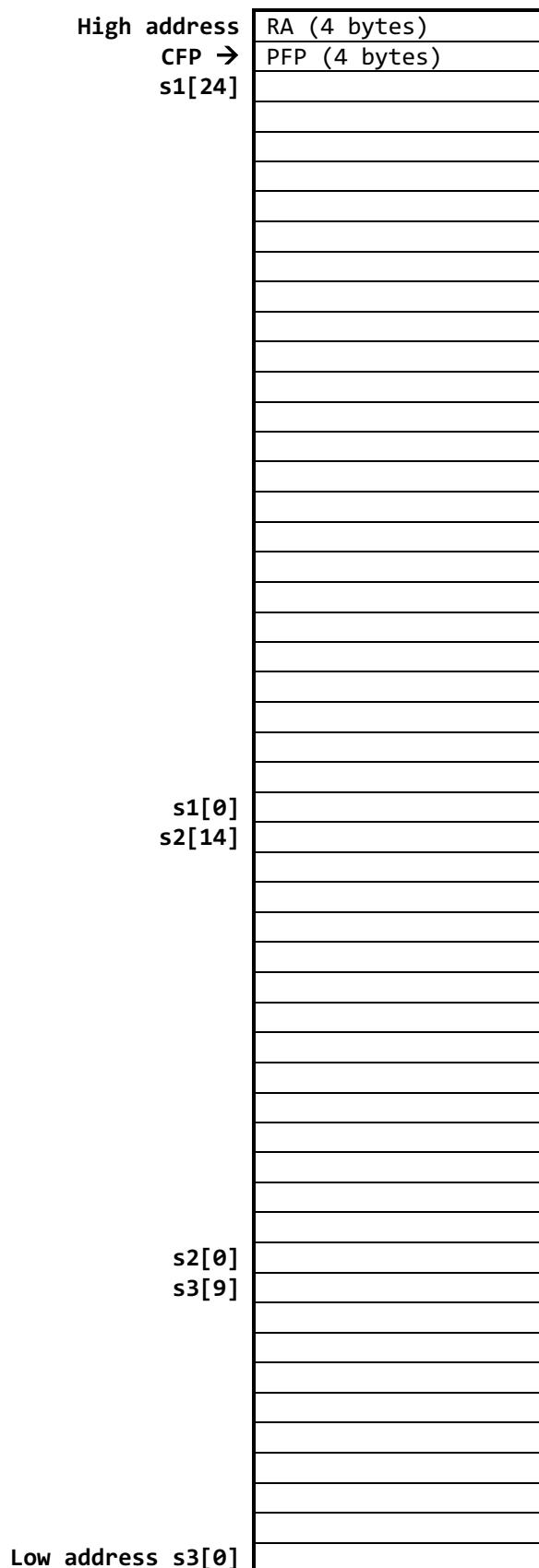
Step 3: Show the stack frame contents AFTER call to `strncpy` function (right table on next page)

Step 4: Use the after call stack frame contents to determine the output produced by the last three print statements.

Stack frame (before call to strncpy)

```
High address   | RA (4 bytes)      |
       CFP →    | PFP (4 bytes)     |
       s1[24]   |                   |
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                |                   |
                |                   |
        s1[0]   |                   |
       s2[14]   |                   |
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                |                   |
                |                   |
                |                   |
                |                   |
                |                   |
        s2[0]   |                   |
        s3[9]   |                   |
                |                   |
                |                   |
                |                   |
                |                   |
Low address s3[0] |                 |
```

Stack frame (after call to strncpy):

```
High address   | RA (4 bytes)      |
       CFP →    | PFP (4 bytes)     |
       s1[24]   |                   |
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                |                   |
                |                   |
                |                   |
        s1[0]   |                   |
       s2[14]   |                   |
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                |                   |
                |                   |
                |                   |
                |                   |
        s2[0]   |                   |
        s3[9]   |                   |
                |                   |
                |                   |
                |                   |
                |                   |
Low address s3[0] |                 |
```