

### Multi-file Program Practice 3

Write a C program that implements a simple student record system. Assume this is a new student record system that replaced an older system. The new system was established in 2010 and uses a 10-character alphanumeric string for the student ID while the old system used an integer. The new system must work with the old system so it must have the capability of storing either a string or integer for the student ID.

Initialize at least 2 students and print their information. Copy the contents of each file in the appropriate space below.

/\*\*\*\*\*\* Sample Output \*\*\*\*\*/

Name:John Smith Year:2000, ID:10343  
Grade: = 83.60 (B)

Name:Anna Johnson Year:2016, ID:S40340  
Grade: = 92.00 (A)

```
/* ***** mactivity.c ***** */
#include<stdio.h>
#include<string.h>
#include"student.h" /* Use quotes for local include */

int main() {
    int ii;
    student_t student1 = {2000, "John Smith", 10343, {80,90,70,95,83}, 'W'};
    student_t student2 = {2016, "Anna Johnson", 0, {80,90,100,95,95}, 'W'};
    strncpy(student2.id.alpha, "S40340", ID_LENGTH);

    printf("\n");
    set_grade(&student1);
    set_grade(&student2);
    print_student(&student1);
    printf("\n");
    print_student(&student2);

    return 0;
}
```

```

/* ***** student.h ***** */
#ifndef STUDENT_H
#define STUDENT_H

#define NAME_LENGTH 40
#define NUM_GRADES 5
#define ID_LENGTH 10

typedef struct {
    int year;
    char name[NAME_LENGTH];
    union {
        int old;
        char alpha[ID_LENGTH];
    } id;
    int grades[NUM_GRADES];
    char grade;
} student_t;

void print_student(const student_t * stu);
double average_grade(const student_t * stu);
void set_grade(student_t * stu);

#endif /* STUDENT_H */

/* ***** student.c ***** */
#include<string.h>
#include<stdio.h>
#include"student.h"

void print_student(const student_t * stu) {
    char id[ID_LENGTH];

    if (stu->year < 2010) {
        sprintf(id, "%d", stu->id.old);
    }
    else {
        strncpy(id, stu->id.alpha, ID_LENGTH);
    }

    printf("Name:%s Year:%d, ID:%s\n", stu->name, stu->year, id);
    printf("    Grade: = %.2f (%c)\n", average_grade(stu), stu->grade);
}

void set_grade(student_t * stu) {
    double average = average_grade(stu);
    if (average < 60.00) {
        stu->grade = 'F';
    }
    else if (average < 70.00) {
        stu->grade = 'D';
    }
    else if (average < 80.00) {

```

```
        stu->grade = 'C';
    }
    else if (average < 90.00) {
        stu->grade = 'B';
    }
    else if (average >= 90.00) {
        stu->grade = 'A';
    }
    else {
        stu->grade = 'W';
    }
}

double average_grade(const student_t * stu) {
    int ii;
    int total = 0;
    for(ii=0;ii<NUM_GRADES;ii++) {
        total += stu->grades[ii];
    }
    return 1.0 * total / NUM_GRADES;
}
```