

# SkillsUSA

## PENNSYLVANIA

# Computer Programming

### **Purpose**

To evaluate each competitor's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of computer programming.

### **Eligibility**

Open to active SkillsUSA members enrolled in programs with computer programming as the occupational objective.

### **Clothing Requirements**

Please follow the SkillsUSA National Technical Standards Clothing Guidelines.

Class E: Competition Specific — Business Casual

Official SkillsUSA white polo shirt

Black dress slacks or black dress skirt (knee-length minimum)

Black closed-toe dress shoes

PA Guidelines state you may wear a white polo without the official SkillsUSA Logo.

### **Safety Requirements**

The SkillsUSA Technical Committee and Judges are released from all responsibility relating to personal injury resulting from the use of the equipment. Contestants will be removed from competition if they are using the equipment in an unsafe manner.

### **Equipment and Materials**

#### **1. Supplied by the technical committee:**

- a. Printer

#### **2. Supplied by the competitor:**

- a. Desktop computer/monitor or laptop/calculator (not a phone)
- b. Software to write and run code in a competitor's programming language of choice – installed before you arrive.

- c. One copy only of the coding reference manual of the language in which they will code the program.
- d. Ballpoint pens or sharpened pencils
- e. Blank notebook paper
- f. One 6' multiple-outlet surge protector
- g. All competitors must create a one-page resume
- h. Printer Paper – 30 pages
- i. Flashdrive for submitting project to Judges

## **Resume Requirement**

Competitors must create a one-page resume. Failure to submit a resume will result in a point deduction penalty.

## **Prohibited Devices**

Cell phones and/or other electronic and wearable devices are NOT allowed in the competition area. This includes restrooms and competition holding areas.

### **Penalties for Prohibited Devices:**

If a competitor's electronic device makes noise or if the competitor is seen using it at any time during the competition, an official report will be documented for review by the SkillsUSA Pennsylvania Championships director. If confirmed that the competitor used the device in a manner which compromised the integrity of the competition, the competitor's scores may be canceled.

## **Scope of the Competition**

For this competition, competitors will be asked to write two separate programs in a specified timeframe identified by the judges for the challenge projects given. The programs may be text based (CLI) or GUI based, although additional points will be awarded for implementing a GUI in the program. Be sure to appropriately comment your code as judges will not only be scoring your program's correctness but also documentation of your code.

## **Knowledge Performance**

There will be no written exam for this competition.

## **Skill Performance and Competition Guidelines**

### **Challenge #1: Encryption**

#### **User Story**

A company wants to transmit data over the internet, but they are concerned about the security issue. All of their data is transmitted as four-digit integers. They have asked you to write a program that will encrypt their data so that it may be transmitted more securely.

#### **Requirements**

- a. Program must only accept four-digit integers.
- b. Create and use an *encrypt* function that takes a four-digit integer and returns an encrypted value as follows:
  1. Replace each digit by (the sum of that digit plus 7) modulus 10.
  2. Then swap the first digit with the third.
  3. Then swap the second digit with the fourth.
- c. Create a *decrypt* function that takes a four-digit integer and returns a decrypted value that is the reverse of the steps above (encrypt function).
- d. Every encrypted message given to the program must be written to a text file.
  1. Most recently sent message at the top of the file and oldest message at the bottom of the file.
  2. The file should persist between runs of the program.
  3. The user should have a way to clear the file
- e. Program must be able to read the text file with the encrypted messages, decrypt the messages, and display all the messages to the user.

### Sample Encrypt/Decryption

- a. Integer *1234* is encrypted to *0189*
- b. Integer *0189* is decrypted to *1234*
- c. Integer *9562* is encrypted to *3962*
- d. Integer *3962* is decrypted to *9562*

### Challenge #2: Grade Report

#### User Story

A school needs a program that allows a user to enter grades for at least 5 different classes and get important information about the user's grades for that class.

#### Requirements

- a. The program must have a way to provide names for each class (at least 5).
- b. Program must have a way for the user to enter multiple scores for each class.

- c. Each class can have an unlimited number of scores entered and can be a different amount each time the program runs.
- d. Based on the scores entered, the program must calculate a current average, highest score, and lowest score for each class.
- e. Based on the current average for each class, the program must calculate a current overall average. The overall average is the average of all the current averages for each class.
- f. Floating point averages of 0.5 or greater must be rounded up to the next whole number for the average score. Floating point averages of less than 0.5 must be rounded down. Example, an average of 89.5 will be as a 90 and a 89.4 will be reported as 89.
- g. Between actions, the following information be displayed to the user:
  - i. The current overall average (across all classes)
  - ii. And for each class:
    - 1. Class Name
    - 2. All Scores Entered
    - 3. Current Average
    - 4. Highest Score
    - 5. Lowest Score

**All Scores are the property of SkillsUSA Pennsylvania.**