CIS-11 Project Documentation

Team 100
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Test Score Calculator
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Part I – Application Overview

Creating an LC-3 program that displays the minimum, maximum and average grade of 5 test scores and display the letter grade associated with the test scores.

Objectives

To create a LC-3 program that can be used as a Test Score Calculator.

Why are we doing this?

- **Will this program save time and money calculating not only test scores but also values that needed to be quickly calculated?**
- **Why is creating a Test Score Calculator necessary?**
- **Who will benefit from this value calculating program? Will schools, companies, etc.**

Business Process

Businesses have been advancing. New software is being introduced more commonly now than ever. This program will not only help teacher, schools, but it will also help businesses. Every business and school must calculate values daily. Most of them have advanced and have used newer software and or calculators. A common way of calculating the minimum, maximum and average grade of test scores is to do mathematics either on paper or by doing calculating them on a calculator and hoping you get the correct result. The disadvantage of this is that you are unable to get the min, max, and average all at the same time.

The program our team will create will advance new technology. We are creating a program that will display the max, min, and average of scores in a matter of seconds. This program will not only increase productivity, but it will also help those who struggle with doing math calculations because the program will do all the difficult steps for the user.

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User Roles and Responsibilities

Schools and companies will benefit most from the program we are creating. Teachers constantly must add up students grades and present them to the students and school. This program will reduce the time it takes to create the final grades for each student because the professor can easily type in values and receive an output of the student's grade. Companies will also likely benefit from this program because rather than needing grades, they can input values such as costs, and or hours of their employees. Supervisors can use this daily to reduce the time and stress it takes to calculate small or large values while also increasing productivity.

Production Rollout Considerations

Our program will be introduced to RCC professors and small companies first. We will document data from these users and ask how likely they are to continue using the program again and if it needs adjustments. Programs can always be improved, but we would like to take consideration feedback from small groups first and then improve where needed and hopefully expand our program to larger companies and school districts.

Terminology

A program refers to a set of instructions given to a computer to produce an output that the creator made. It is built on codes that might not be very familiar to most people, but each code does have a special meaning.

Part II – Functional Requirements

Our program will display the minimum, maximum and average grade of 5 test scores and display the letter grade associated with the test scores. The user will be prompted to input test scores.

The program will contain appropriate addresses: origination, fill, array, input and output. Display minimum, max, average values/grades in console. Use appropriate labels and comments. Contain appropriate instructions for arithmetic, data movement and conditional operations. Comprise of 2 or more subroutines and implement subroutine calls. Use branching for control: conditional and iterative. Manage overflow and storage allocation. Manage stack: include PUSH-POP operation on stack. Include save-restore operations. Include pointer. Implement ASCII conversion operations. Use appropriate system call directives.

Statement of Functionality

This program asks the user to enter five test scores one by one. It then finds the lowest score, the highest score, and calculates the average of all five scores. After that, it figures out the letter grade based on the average score. The program shows the lowest score, highest score, average score, and the letter grade on the screen. The program is organized into smaller parts called subroutines. These parts help it read your input, do the math, and display the result. The program converts the numbers into letters so they can be shown properly on the screen.

Scope

The program will read user input, store test scores, perform calculations, assign letter grades, manage the stack, handle ASCII conversions, and display output.

Performance

The program will have 100% accuracy in calculating and displaying values. The opening a file will take less than 3 seconds for 90% of the files and less than 10 seconds for every file. The results will be displayed to the screen in under 2 seconds.

Documenting Requests for Enhancements

Date	**Enhancement**	**Requested by**	**Notes**	**Priority**	**Release No/ Status**
May 19 2025	Allow user to enter more than 5 test scores.	Professor	To test more numbers at once.	High	0000
May 21 2025	Highlight different values in output	Supervisor	To make results easier to read.	Low	0001
May 22 2025	Include names of students.	Professor	To make organizing grades easier.	Medium	0002

Part III – Appendices

Appendix A: Grading Scale
The program uses the following grading scale:

A: 90–100, B: 80–89, C: 70–79, D: 60–69, F: 0–59.

Flow Chart

```
+-----------------------------+
| START_PROGRAM               |
| Display "Enter 5 Test Scores"|
+-----------------------------+
           |
           v
+-----------------------------+
| Loop 5 times:               |
|  - Call GET_GRADE           |
|  - Call VALIDATE_DIGIT      |
|  - Store grade              |
|  - Call GET_LETTER          |
+-----------------------------+
           |
           v
+-----------------------------+
| Call CALCULATE_MAX          |
| Display MAX score           |
+-----------------------------+
           |
           v
+-----------------------------+
| Call CALCULATE_MIN          |
| Display MIN score           |
+-----------------------------+
           |
           v
+-----------------------------+
| Call CALCULATE_AVG          |
| Display AVG score           |
+-----------------------------+
           |
           v
+-----------------------------+
| Call RESTART_PROG           |
| Prompt Y/N                  |
+-------------+---------------+
            |Yes                |No
            v                   v
     Jump to START        Halt program
```

Pseudo-code

```
START

Display "Enter 5 Test Scores:"

FOR i
    Display newline
    CALL GET_GRADE  // Input and validate 2-digit score
    Store returned grade in GRADES
    CALL GET_LETTER // Convert numeric grade to letter
    CALL        // Display letter grade
END FOR

Display newline

// Calculate MAX
Set MAX_GRADE = GRADES
FOR each grade in GRADES
    IF grade > MAX_GRADE THEN
        MAX_GRADE = grade
    END IF
END FOR
Display "MAX " + MAX_GRADE

// Calculate MIN
Set MIN_GRADE = GRADES
FOR each grade in GRADES
    IF grade < MIN_GRADE THEN
        MIN_GRADE = grade
    END IF
END FOR
Display "MIN " + MIN_GRADE

// Calculate AVG
sum = 0
FOR each grade in GRADES
    sum = sum + grade
END FOR
average = sum / 5
Display "AVG " + average

CALL RESTART_PROG  // Ask user if they want to run again

IF user input is 'Y'
    Restart program from beginning
ELSE
    HALT

END
```