CS 162: Computer Science II

Algorithm Design Document

Make a copy before you begin (File -> Make a copy). Add the Assignment # above and complete the sections below BEFORE you begin to code. The sections will expand as you type. When you are finished, download this document as a PDF (File -> Download -> PDF) and submit to D2L.

This document contains an interactive checklist. To mark an item as complete, click on the box (the entire list will be highlighted), then right click (the clicked box will only be highlighted), and choose the checkmark.

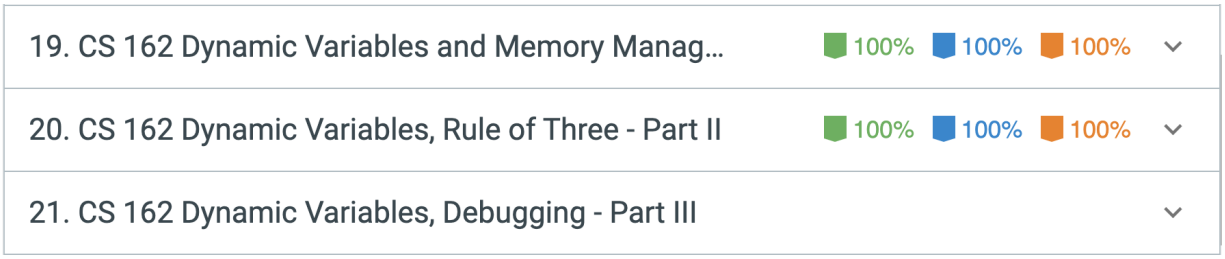
Planning your program before you start coding is part of the development process. In this document you will:

- ☑ ~~Paste a screenshot of your zyBooks Challenge and Participation %~~
- ☑ ~~Paste a screenshot of your assigned zyLabs completion~~
- ☑ ~~Write a detailed description of your program, at least two complete sentences~~
- ☑ ~~If applicable, design a sample run with test input and output~~
- ☑ ~~Identify the program inputs and their data types~~
- ☑ ~~Identify the program outputs and their data types~~
- ☑ ~~Identify any calculations or formulas needed~~
- ☑ ~~Write the algorithmic steps as pseudocode~~

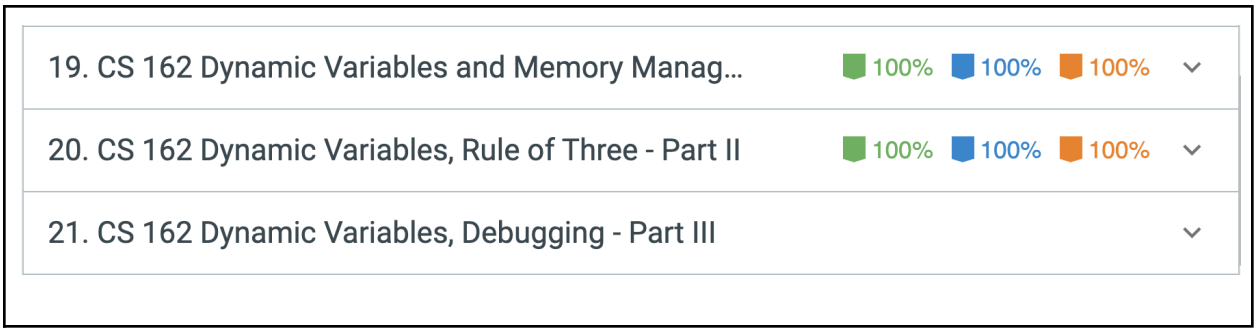
1. zyBooks

Add your zyBooks screenshots for the % and assigned zyLabs completions below. Required percentages: all **assigned** zyLabs, Challenge Activity with at least 70%, and Participation Activity with at least 80%.

Challenge and Participation % screenshot:



Assigned zyLabs completion screenshot:



2. Program Description

In the box below, describe the purpose of the program. You must include a detailed description with at least two complete sentences.

Program description:
Program designed to keep track of activities. Users can view the list of activities or search for activities based on name, type, or location. They can also add and remove activities from the list. The app will load the list of activities from an external .txt file and modify the .txt file based on user input.

3. Sample Run

If you are designing your own program, you will start with a sample run. **Imagine** a user is running your program - what will they see? What inputs do you expect, and what will be the outputs from the given inputs? Choose test data you will use to test your program. Calculate and show the expected outputs. Use the sample run to test your program.
Do not simply copy the sample run from the assignment instructions!

Sample run:
Welcome! This program will help you manage your activities. Pick an option from below: (a)Add a new activity (b)List activities by name (c)List activities by location (d)List activities by Type (e)Remove an activity (f)Search by activity name

```
(q)Quit

b
```
1. Catan;Epic Gaming;Easy;4;Games

2. Oil Painting;Fun Studios;Tricky;6;Arts

3. Pottery;Fun Studios;Easy;7;Arts

4. Skiing;Mt Hood Meadows;Difficult;6;Athletics

5. Snowboarding;Mt Hood Meadows;Not for Faint of heart;8;Athletics

6. Wine Making;Umpqua Valley;Complicated;9;Food

```
Pick an option from below:

(a)Add a new activity
(b)List activities by name
(c)List activities by location
(d)List activities by Type
(e)Remove an activity
(f)Search by activity name
(q)Quit

p
Invalid option!! Please try again!

Pick an option from below:

(a)Add a new activity
(b)List activities by name
(c)List activities by location
(d)List activities by Type
(e)Remove an activity
(f)Search by activity name
(q)Quit

d
Enter Type number(0-Athletics, 1-Food, 2-Arts, 3-Games, and
4-Others): 0
```

Skiing;Mt Hood Meadows;Difficult;6;Athletics

Snowboarding;Mt Hood Meadows;Not for Faint of heart;8;Athletics

```
Pick an option from below:

(a)Add a new activity
(b)List activities by name
(c)List activities by location
(d)List activities by Type
(e)Remove an activity
(f)Search by activity name
(q)Quit

C
Enter location name: Hood Meadows

1. Skiing;Mt Hood Meadows;Difficult;6;Athletics
2. Snowboarding;Mt Hood Meadows;Not for Faint of heart;8;Athletics


Pick an option from below:

(a)Add a new activity
(b)List activities by name
(c)List activities by location
(d)List activities by Type
(e)Remove an activity
(f)Search by activity name
(q)Quit

e
1. Catan;Epic Gaming;Easy;4;Games
2. Oil Painting;Fun Studios;Tricky;6;Arts
3. Pottery;Fun Studios;Easy;7;Arts
4. Skiing;Mt Hood Meadows;Difficult;6;Athletics
5. Snowboarding;Mt Hood Meadows;Not for Faint of heart;8;Athletics
6. Wine Making;Umpqua Valley;Complicated;9;Food


Pick the index to remove: 4

Activity removed!
1. Catan;Epic Gaming;Easy;4;Games
2. Oil Painting;Fun Studios;Tricky;6;Arts
```

3. Pottery;Fun Studios;Easy;7;Arts

4. Snowboarding;Mt Hood Meadows;Not for Faint of heart;8;Athletics

5. Wine Making;Umpqua Valley;Complicated;9;Food

```
Pick an option from below:

(a)Add a new activity
(b)List activities by name
(c)List activities by location
(d)List activities by Type
(e)Remove an activity
(f)Search by activity name
(q)Quit

a
Enter the activity name (50 characters or less): Rowing
Enter the activity location (50 characters or less): Oaks Amusement
Park
Enter the activity level : Tricky
Enter the activity rating : aaa
Invalid rating! Please enter a valid rating!
Enter the activity rating : 8
Enter Type number(0-Athletics, 1-Food, 2-Arts, 3-Games, and
4-Others): 0

Activity added!
```

1. Catan;Epic Gaming;Easy;4;Games

2. Oil Painting;Fun Studios;Tricky;6;Arts

3. Pottery;Fun Studios;Easy;7;Arts

4. Rowing;Oaks Amusement Park;Tricky;8;Athletics

5. Snowboarding;Mt Hood Meadows;Not for Faint of heart;8;Athletics

6. Wine Making;Umpqua Valley;Complicated;9;Food

```
Pick an option from below:

(a)Add a new activity
(b)List activities by name
(c)List activities by location
(d)List activities by Type
(e)Remove an activity
```

```
(f)Search by activity name
(q)Quit

f
Enter the activity name (50 characters or less): Snowboarding

Activity found!
5. Snowboarding;Mt Hood Meadows;Not for Faint of heart;8;Athletics

Pick an option from below:

(a)Add a new activity
(b)List activities by name
(c)List activities by location
(d)List activities by Type
(e)Remove an activity
(f)Search by activity name
(q)Quit

f
Enter the activity name (50 characters or less): Skiing
Activity not found!!

Pick an option from below:

(a)Add a new activity
(b)List activities by name
(c)List activities by location
(d)List activities by Type
(e)Remove an activity
(f)Search by activity name
(q)Quit

q

Activities written to file! Thank you for using my program!!
```

4. Algorithmic Design

Before you begin coding, **you must first plan out the logic** and think about what data you will use to test your program for correctness. All programmers plan before coding - this saves a lot of time and frustration! Use the steps below to identify the inputs and outputs, calculations, and steps needed to solve the problem.

Use the pseudocode syntax shown in the document, supplemented with English phrases if necessary. **Do not include any implementation details (e.g. source code file names, class or struct definitions, or language syntax)**. Do not include any C++ specific syntax or data types.

Algorithmic design:
● Identify and list all of the user input variables and their data types. Include a variable name, data type, and description. Data types include string, integer, floating point, (single) character, and boolean. Data structures should be referenced by name, e.g. “array of integer” or “array of string”.
○ Char option ○ String name, location, level ○ Int rating, type
● Identify and list all of the user output variables and their data types. Include a variable name, data type, and description. Data types include string, integer, floating point, (single) character, and boolean. Data structures should be referenced by name, e.g. “array of integer” or “array of string”.
○ String name, location, level ○ Int rating, type
● What calculations do you need to do to transform inputs into outputs? List all formulas needed, if applicable. If there are no calculations needed, state there are no calculations for this algorithm. Formulae should reference the variable names from step a and step b as applicable.
○ Addition/subtraction to add/remove activities
● Design the logic of your program using pseudocode. Here is where you would use conditionals, loops or functions (if applicable) and list the steps in transforming inputs into outputs. Walk through your logic steps with the test data from the assignment document or the sample run above. **Use the syntax shown at the bottom of this document. Do not include any implementation details (e.g. file names) or C++ specific syntax.**

ACTIVITY.H

1. DECLARE const MAXCHAR = 50
2. CLASS Activity
    a. PRIVATE
        i. activityName as a char array pointer
        ii. activityLocation as a char array pointer
        iii. activityLevel as as a char array pointer
        iv. activityType as a char array pointer
        v. activityRating as an integer
    b. PUBLIC
        i. Constructors/Destructor
            1. Activity - default constructor
            2. Activity - constructor w/ params
            3. Activity - copy constructor
            4. Activity - destructor
        ii. Mutators
            1. setActivityName - assign char array pointer to activityName
            2. setActivityLocation - assign char array pointer to activityName
            3. setActivityLevel - assign char array pointer to activityName
            4. setActivityRating - assign char array pointer to activityName
            5. setActivityType - assign char array pointer to activityName
        iii. Accessors
            1. getActivityName - assign char array pointer to activityName
            2. getActivityLocation - assign char array pointer to activityName
            3. getActivityLevel - assign char array pointer to activityName
            4. getActivityRating - assign char array pointer to activityName
            5. getActivityType - assign char array pointer to activityName
        iv. printActivity - Display single activity to console
        v. writeActivity - Write single activity to outFile
        vi. &operator - assignment operator overloading

ACTIVITYLIST.H

3. DECLARE const CAP = 30
4. DECLARE const GROWTH = 5
5. CLASS ActivityList
    a. PRIVATE
        i. activityList as Activity array pointer
        ii. size as int
        iii. capacity as int
        iv. Growlist - increase size of array
    b. PUBLIC
        i. Constructors

1. ActivityList - default constructor
2. ActivityList - constructor w/ params

ii. Destructors
1. ~ActivityList

iii. Database Functions
1. addActivity
2. searchByName - display activities of a certain name
3. searchByType - display activities of a certain type
4. searchByLocation - display activities of a certain location
5. showList - display list
6. removeActivity - remove activity from list
7. writeData - Write data to outfile

6. Function Prototypes
   a. addActivity - Add activity to ActivityList
   b. removeActivity - Remove activity from ActivityList
   c. searchByName - Prompts user for name, returns activities with matching name
   d. searchByType - Prompts user for type, returns activities with matching type
   e. searchByLocation - Prompts user for location, returns activities with matching location
   f. showList - Displays list of activities
   g. writeData - Writes data to external file

TOOLS.H

1. Function Prototypes
   a. readInt - determines input is a positive integer
   b. readString - determines input does not contain a semicolon
   c. isLessThan - helper function utilized by loadData for sorting
   d. displayMenu - displays options to user
   e. readOption - reads user input
   f. exeCmd - calls function associated with user input
   g. welcomeMessage - displays welcome message
   h. goodbyeMessage - displays goodbye message
   i. addActivity - displays prompts and calls setter methods
   j. retrieveActivityType - maps type number to type string

ACTIVITY.CPP

7. DEFAULT CONSTRUCTOR Activity
   a. SET activityName = “no name”
   b. SET activityLocation = “no location”
   c. SET activityLevel = “no level”
   d. SET activityRating = “0”
   e. SET activityType = “no type”

END CONSTRUCTOR

8. CONSTRUCTOR Activity
    a. SET activityName = new char[MAXCHAR]
    b. SET activityLocation =new char[MAXCHAR]
    c. SET activityLevel = new char[MAXCHAR]
    d. SET activityRating = new char[MAXCHAR]
    e. SET activityType = new char[MAXCHAR]

    END CONSTRUCTOR

9. COPY CONSTRUCTOR Activity
    a. SET activityName = new char[activityName length + 1]
    b. SET activityLocation =new char[activityLocation length + 1]
    c. SET activityLevel = new char[activityLevel length + 1]
    d. SET activityRating = new char[activityType length + 1]
    e. This = activiy

    END CONSTRUCTOR

10. DESTRUCTOR Activity
    a. IF(activityName)
        i. Delete activityName
        ii. activityName = NULL
    b. IF(activityLocation)
        i. Delete activityLocation
        ii. activityName = NULL
    c. IF(activityLevel)
        i. Delete activityLevel
        ii. activityName = NULL
    d. IF(activityType)
        i. Delete activityType
        ii. activityName = NULL

MUTATOR FUNCTIONS

11. FUNCTION setActivityName
    a. IF(activityName)
        i. Delete activityName
        ii. activityName = NULL
    b. SET activityName = new char[activityName length + 1]
    c. SET activityName = newActivityName

    END FUNCTION setActivityName

12. FUNCTION setActivityLocation

a. IF(activityLocation)
    i. Delete activityLocation
    ii. activityLocation = NULL
b. SET activityLocation = new char[activityLocation length + 1]
c. SET activityLocation = newActivityLocation

END FUNCTION setActivityLocation

13. FUNCTION setActivityLevel
    a. IF(activityLevel)
        i. Delete activityLevel
        ii. activityLevel = NULL
    b. SET activityLevel = new char[activityLevel length + 1]
    c. SET activityLevel = newActivityLevel

END FUNCTION setActivityLevel

14. FUNCTION setActivityRating
    a. SET activityRating = newActivityRating

END FUNCTION setActivityRating

15. FUNCTION setActivityType
    a. IF(activityType)
        i. Delete activityType
        ii. activityType = NULL
    b. SET activityType = new char[activityType length + 1]
    c. SET activityType = newActivityType

END FUNCTION setActivityType

ACCESSOR FUNCTIONS

16. FUNCTION getActivityName
    a. returnActivityName = activityName

END FUNCTION getActivityName

17. FUNCTION getActivityLocation
    a. returnActivityLocation = activityLocation

END FUNCTION getActivityLocation

18. FUNCTION getActivityLevel
    a. returnActivityName = activityLevel

END FUNCTION getActivityLevel

19. FUNCTION getActivityRating
    a. returnActivityRating = activityRating

    END FUNCTION getActivityRating

20. FUNCTION getActivityType
    a. returnActivityType = activityType

    END FUNCTION getActivityType

21. FUNCTION printActivity
    a. DISPLAY activityName
    b. DISPLAY activityLocation
    c. DISPLAY activityLevel
    d. DISPLAY activityRating
    e. DISPLAY activityType

    END FUNCTION printActivity

22. FUNCTION ASSIGNMENT OPERATOR Activity
    a. IF(this = anActivity)
        i. RETURN this
    b. ELSE
        i. CALL setActivityName
        ii. CALL setActivityLocation
        iii. CALL setActivityLevel
        iv. CALL setActivityRating
        v. CALL setActivityType
    c. RETURN this

    FUNCTION ASSIGNMENT OPERATOR Activity

23. FUNCTION writeActivity
    a. OUTPUT activityName
    b. OUTPUT activityLocation
    c. OUTPUT activityLevel
    d. OUTPUT activityRating
    e. OUTPUT activityType

    END FUNCTION writeActivity

ACTIVITYLIST.CPP

24. DEFAULT CONSTRUCTOR ActivityList
    a. SET capacity = CAP
    b. SET list = new Activity[CAP]

c. SET size = 0

END CONSTRUCTOR

25. CONSTRUCTOR ActivityList
    a. SET size = 0
    b. SET capacity = CAP
    c. SET list = new Activity[capacity]
    d. DECLARE inFile
    e. DECLARE activity
    f. DECLARE tempString
    g. DECLARE tempNumber
    h. IF(!inFile)
        i. DISPLAY error message
        ii. EXIT
    i. WHILE(inFile)
        i. CALL setActivityName
        ii. CALL setActivityLocation
        iii. CALL setActivityLevel
        iv. CALL set ActivityRating
        v. CALL setActivityType
        vi. CALL addActivity
    j. END WHILE LOOP

END CONSTRUCTOR

26. DESTRUCTOR ActivityList
    a. IF(list)
        i. DELETE list
        ii. SET list = NULL

END DESTRUCTOR

27. FUNCTION addActivity
    a. IF(size = capacity)
        i. CALL growList()
    b. DECLARE i = 0
    c. DECLARE tempActivityName
    d. DECLARE newActivityName
    e. CALL getActivityName
    f. FOR i = 0 until size
        i. CALL getActivityName()
        ii. IF tempActivityName != newActivityName
            1. BREAK
    g. END FOR LOOP

h. FOR j = size until j > i
    i. avtivityList[i] = activityList[j - 1]
i. END FOR LOOP
j. SET activityList[i] = activity
k. SET size = size +1
l. DISPLAY “activity added”

END FUNCTION addActivity

28. FUNCTION searchByName
    a. DECLARE searchName
    b. DECLARE tempName
    c. DECLARE count = 1
    d. DISPLAY "Please enter activity name"
    e. INPUT searchName
    f. CALL getActivityName
    g. FOR from i = 0 till size
        i. IF(location[i] == searchName)
            1. DISPLAY activity[i]
        ii. ELSE
            1. Count++
    h. END FOR LOOP
    i. IF(count == size)
        i. DISPLAY “Activity Not Found!”

END FUNCTION

29. FUNCTION searchByLocation
    a. DEFINE searchLocation[MAXCHAR];
    b. DEFINE count
    c. DISPLAY "Please enter activity location"
    d. INPUT searchLocation
    e. CALL getActivityLocation
    f. FOR from i = 0 till size
        i. IF(location[i] == searchLocation)
            1. DISPLAY activity[i]
        ii. ELSE
            1. Count++
    g. END FOR LOOP
    h. IF(count == size)
        i. DISPLAY “Activity Not Found!”

END FUNCTION searchByLocation

30. FUNCTION searchByType

a. DEFINE searchType[MAXCHAR];
b. DEFINE count
c. DISPLAY "Please enter activity type"
d. INPUT searchType
e. CALL retrieveActivityType
f. FOR from i = 0 till size
    i. IF(type[i] == searchType)
        1. DISPLAY activity[i]
    ii. ELSE
        1. Count++
g. END FOR LOOP
h. IF(count == size)
    i. DISPLAY “Activity Not Found!”

END FUNCTION searchByType

31. FUNCTION writeData
    a. DECLARE outFile
    b. OPEN outFile
    c. FOR i = 0 until size
        i. CALL writeActivity
    d. END FOR LOOP

    END FUNCTION writeDate

32. FUNCTION showList
    a. FOR i = 0 until size
        i. DISPLAY i
        ii. CALL printActivity()
    b. END FOR LOOP

    END showList

33. FUNCTION removeActivity
    a. DECLARE delIndex
    b. CALL readInt()
    c. IF (delIndex < size)
        i. FOR i = delIndex until i < size
            1. activityList[i - 1] = activityList[i]
        ii. END FOR LOOP
    d. SET size = size - 1
    e. DISPLAY “Activity Removed”

    END removeActivity

34. FUNCTION growList

a. SET capacity += growth
b. DECLARE tempList = NEW Activity[capacity]
c. FOR i = 0 to size
    i. Templist[i[= list[i]
d. END FOR LOOP
e. DELETE list
f. List = tempList
g. tempList = NULL

END FUNCTION growList

TOOLS.CPP

35. FUNCTION readInt
    a. DISPLAY prompt
    b. INPUT temp
    c. WHILE (!cin || temp < 0)
        i. DISPLAY "Invalid number! Please try again!!!"
        ii. DISPLAY prompt
        iii. INPUT temp
    d. RETURN temp

    END FUNCTION readInt

36. FUNCTION readString
    a. DISPLAY prompt;
    b. INPUT tempString
    c. FOR i = 0 to tempString.length
        i. IF(temp[i] == ';')
            1. DISPLAY "Invalid string! Please remove all commas from entry!"
            2. CALL readString
    d. END FOR LOOP

    END FUNCTION readString

37. FUNCTION isLessThan
    a. IF (activityName1 = activityName2) {
        i. RETURN true
    b. ELSE
        i. RETURN false

    END FUNCTION isLessThan

38. FUNCTION displayMenu
    a. DISPLAY "Pick an option from below:"
    b. DISPLAY "(a)Add a new activity"

c. DISPLAY "(b)List activities by name"
d. DISPLAY "(c)List activities by location"
e. DISPLAY "(d)List activities by Type"
f. DISPLAY "(e)Remove an activity”
g. DISPLAY "(f)Search by activity name"
h. DISPLAY "(q)Quit"

END FUNCTION displayMenu

39. FUNCTION readOption() {
    a. DECLARE input;
    b. INPUT input;
    c. RETURN input;

END FUNCTION readOption()

40. FUNCTION executeCommand
    a. SELECT tempNumber
        i. CASE a
            1. CALL addActivity()
            2. CALL activityList.addActivity()
            3. CALL activityList.showList()
            4. BREAK
        ii. CASE b
            1. CALL showList()
            2. BREAK
        iii. CASE c
            1. CALL searchByLocation()
            2. BREAK
        iv. CASE d
            1. CALL searchByType()
            2. BREAK
        v. CASE e
            1. CALL showList()
            2. CALL removeActivity()
            3. CALL showList()
            4. BREAK
        vi. CASE f
            1. CALL searchByName()
            2. BREAK
        vii. CASE q
            1. BREAK
        viii. DEFAULT
            1. DISPLAY “Invalid Option”

END FUNCTION executeCommand

41. FUNCTION writeData
    a. OPEN outFile
    b. FOR int i =0 until size
        i. INPUT activityList[i].name;
        ii. INPUT activityList[i].location;
        iii. INPUT activityList[i].level;
        iv. INPUT activityList[i].rating;
        v. INPUT activityList[i].type;
    c. END FOR LOOP
    d. CLOSE outFile
    e. DISPLAY "Activities written to file! Thank you for using my program!!"

END FUNCTION writeData

42. FUNCTION welcomeMessage
    a. DISPLAY “Welcome”
    b. DISPLAY “This program will help you manage your activities”

END FUNCTION

43. FUNCTION goodbyeMessage
    a. DISPLAY "Activities written to file! Thank you for using my program!!"

END FUNCTION

44. FUNCTION retrieveActivityType
    a. SELECT tempNumber
        i. CASE 0
            1. activityListType = “Athletics”
        ii. CASE 1
            1. activityListType = “Food”
        iii. CASE 2
            1. activityListType = “Arts”
        iv. CASE 3
            1. activityListType = “Games”
        v. CASE 4
            1. activityListType = “Others”

END FUNCTION printActivityType

45. FUNCTION addActivity
    a. DECLARE letter
    b. DECLARE tempName, tempLocation, tempLevel, tempType
    c. DECLARE tempRating, tempIntType

d. DISPLAY prompt
e. INPUT tempName
f. DISPLAY prompt
g. INPUT tempLocation
h. DISPLAY prompt
i. INPUT tempLevel
j. DISPLAY prompt
k. INPUT tempRating
l. DISPLAY prompt
m. INPUT tempIntType
n. CALL retrieveActivityType()
o. CALL setActivityName()
p. CALL setActivityLocation()
q. CALL getActivityLevel()
r. CALL setActivityRating()
s. CALL setActivityType()

END FUNCTION addActivity

DRIVER.CPP

46. FUNCTION main()
    a. DECLARE fileName
    b. DECLARE option
    c. CALL welcomeMessage()
    d. CALL ActivityList
    e. DO
        i. CALL displayMenu()
        ii. SET option = readOption()
        iii. CALL executeCommand()
    f. WHILE (option != q)
    g. CALL writeData()
    h. CALL goodbyeMessage()

END FUNCTION main()

5. Pseudocode Syntax

Think about each step in your algorithm as an action and use the verbs below:

To do this:	Use this verb:	Example:
Create a variable	DECLARE	`DECLARE integer num_dogs`

Print to the console window	DISPLAY	`DISPLAY "Hello!"`
Read input from the user into a variable	INPUT	`INPUT num_dogs`
Update the contents of a variable	SET	`SET num_dogs = num_dogs + 1`
Conditionals		

Use a single alternative conditional	IF *condition* THEN
	  statement
	  statement
	END IF
		`IF num_dogs > 10 THEN`
		`  DISPLAY "That is a lot of dogs!"`
		`END IF`

Use a dual alternative conditional	IF *condition* THEN
	  statement
	  statement
	ELSE
	  statement
	  statement
	END IF
		`IF num_dogs > 10 THEN`
		`  DISPLAY "You have more than 10 dogs!"`
		`ELSE`
		`  DISPLAY "You have ten or fewer dogs!"`
		`END IF`

Use a switch/case statement	SELECT *variable or expression*
	  CASE *value_1:*
	  statement
	  statement
	  CASE *value_2:*
	  statement
	  statement
	  CASE *value_2:*
	  statement
	  statement
	  DEFAULT:
	  statement
	  statement
	END SELECT
		`SELECT num_dogs`
		`  CASE 0: DISPLAY "No dogs!"`
		`  CASE 1: DISPLAY "One dog.."`
		`  CASE 2: DISPLAY "Two dogs.."`
		`  CASE 3: DISPLAY "Three dogs.."`
		`  DEFAULT: DISPLAY "Lots of dogs!"`
		`END SELECT`

Loops		

Loop while a condition is true - the loop body will execute 0 or more times.	WHILE *condition*
	  statement
	  statement
	END WHILE
		`SET num_dogs = 1`
		`WHILE num_dogs < 10`
		`  DISPLAY num_dogs, " dogs!"`
		`  SET num_dogs = num_dogs + 1`
		`END WHILE`

Loop while a condition is true - the loop body will execute 1 or more times.	DO
	  statement
	  statement
	WHILE *condition*
		`SET num_dogs = 1`
		`DO`
		`  DISPLAY num_dogs, " dogs!"`
		`  SET num_dogs = num_dogs + 1`
		`WHILE num_dogs < 10`

Loop a specific number	FOR *counter* = *start* TO *end*	`FOR count = 1 TO 10`

of times.	*statement* *statement* END FOR	DISPLAY num_dogs, " dogs!" END FOR
Functions		
Create a function	FUNCTION *return_type name (parameters)* *statement* *statement* END FUNCTION	FUNCTION Integer add(Integer num1, Integer num2) DECLARE Integer sum SET sum = num1 + num2 RETURN sum END FUNCTION
Call a function	CALL *function_name*	CALL add(2, 3)
Return data from a function	RETURN *value*	RETURN 2 + 3