

# Programming With Livecode



LIVECODE 5.5.3  
and below



LIVECODE 6  
and above



Higher

**Materials produced at GHS  
By Mr S. whyte**

# The Software Development Process

## Introduction

The Software Development Process (**SDP**) can be split into **7 main** steps which are carried out in **order**. These steps should be carried out when creating **any** programming project and are summarised below.

## Analysis

# A

A statement about **what** your program is going to do. The analysis stage will also cover areas of **feasibility**, i.e. is there enough **time** and **money** available to complete the project?

## Design

# Dance

This involves designing both the **user interface** and the **structure** of the **program code**.

For the purpose of Higher Computing, more emphasis will be placed on designing the **structure** of the **program code** rather than the design of the user interface. We will be using a design notation known as **pseudocode** to achieve this. More is mentioned about pseudocode on the next page.

## Implementation

# In

The implementation stage involves keying in the program code using the built in **text editor** within the programming environment. We will use LiveCode to create our programs.

## Testing

# The

Testing is an important part of any project. Testing ensures that your program is **reliable** and **robust** in the sense that it should produce the **correct results** and **not crash** due to **unexpected input**.

We should test our program with **three** sets of test data. These are:

- **Normal** (accepted data within a set range)
- **Extreme** (accepted data on the boundaries)
- **Exceptional** (data that is not accepted).



## Documentation

# Dark

Documentation is usually produced in the form of a **user guide** and a **technical guide**. The user guide shows the user how to **use** the **functions** and **features** of the **software** whereas the **technical guide** gives the user information on how to **install** the **software** as well as the **minimum system requirements**.

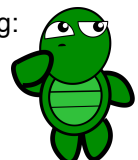
## Evaluation

# Every

An evaluation is usually a **review** which shows that your program is **fit for purpose**, in other words, it does **exactly** what it was **designed** to do.

The evaluation should also focus on the **readability** of your program code. For example, if **another programmer** was asked to **maintain** your program code at a later date, would they be able to understand what was going on? You should always ensure your program is **readable** by doing the following:

- **Use of meaningful identifiers** for **variable** and **array names**
- **Use of internal commentary** ( // *This subroutine will do the following....* )
- **Effective use of white space** between **subroutines** to **space out** the **program**.
- **Indentation** to show the **start** and **end** of any control structures such as a **fixed loop**.
- **Parameter passing** to show the programmer what **variables** and **arrays** are being **passed in** and **out** of each **subroutine** and which **parameters** are being **changed**.



## Maintenance

# Monday

Maintenance is performed at the **very end** of the project. You will not be required to perform any maintenance on your programs but you will need to know about **Corrective**, **Adaptive** and **Perfective** maintenance. These are covered in the Software Development theory notes.

# The Design Process

## Pseudocode and Data Flow

The design of a program is **very important** as it allows the programmer to **think** about the **structure** of the program **before** they begin to **create** it.



The most common way to design the logic of a program is to use a text-based notation known as **Pseudocode**. **Pseudocode** is a cross between **programming language** and our own **English language**. It makes a program **easier** to **understand** without relying on the use of a programs complex **commands** and **syntax**.

The design is built up of two parts, the **first** is the **Stepwise design**. This shows the **main steps** of the program. The **second** part is the **Stepwise Refinement**. This involves **breaking** these **main steps** into even **smaller steps** so eventually, **one line of pseudocode** becomes **one line of program code**.

Here is the program pseudocode to calculate the volume of a room using the variables **length**, **breadth**, **height** and **room\_volume**. Study both the **pseudocode** and **data flow** very closely to understand what is going on:

### Stepwise Design (the main steps of the program)

- |    |                                   |   |
|----|-----------------------------------|---|
| 1. | <b>Setup the global variables</b> | No Data flow required                                 |
| 2. | <b>Initialise variables</b>       | No Data flow required                                 |
| 3. | <b>Get room measurements</b>      | <b>In/Out:</b> room_length, room_breadth, room_height |

**Data flow explanation for step 3:** Since room\_length, room\_breadth and room\_height will have been initialised to 0 in the subroutine initialise, they are coming into this step with the value 0 and will be given new values according to the size of the room. Hence they are **IN** as 0's and then passed as **OUT** as a new value.

- |    |                              |  |
|----|------------------------------|--|
| 4. | <b>Calculate Room Volume</b> | <b>In:</b> room_length, room_breadth, room_height <b>In/Out:</b> room_volume |
|----|------------------------------|--|

**Data flow explanation for step 4:** The room\_length, room\_breadth and room\_height variables are passed **IN** to be used in the calculation for room\_volume. As a result, they are not changing their values so are just passed as **IN's**. The room\_volume variable would have been set to 0 in the initialise subroutine and as a result of the calculation, room\_volume will be given a **new** value so it's **IN/OUT**.

- |    |                            |                        |
|----|----------------------------|------------------------|
| 5. | <b>Display Room Volume</b> | <b>In:</b> room_volume |
|----|----------------------------|------------------------|

**Data flow explanation for step 5:** Only the room\_volume is to be displayed and it is **not** changing in value from what was calculated in step 4, so it is just an **IN** variable within this subroutine.

### Stepwise Refinement (the main steps further refined into smaller steps)

- |     |  |
|-----|--|
| 1.  | <b>Setup variables</b>   |
| 1.1 | Setup room_length, room_breadth, room_height and room_volume as global variables                     |
| 2.  | <b>Initialise variables</b>  |
| 2.1 | Put 0 into room_length, room_breadth, room_height and room_volume                                    |
| 3.  | <b>Get room measurements</b>   |
| 3.1 | Ask the user for the length of the room in metres  |
| 3.2 | Put it into the variable room_length   |
| 3.3 | Ask the user for the breadth of the room in metres   |
| 3.4 | Put it into the variable room_breadth  |
| 3.5 | Ask the user for the height of the room in metres  |
| 3.6 | Put it into the variable room_height   |
| 4.  | <b>Calculate room volume</b>   |
| 4.1 | Put room_length * room_breadth * room_height into room_volume  |
| 5.  | <b>Display room volume</b>   |
| 5.1 | Put a message telling the user the volume of the room in cubic metres using the variable room_volume |

#### **Stepwise Refinement:**

The main steps are broken down further (refined). We use 3.1, 3.2, 3.3, etc.

Notice that the pseudocode looks **more** like our own language rather than that of the programs.

# What are Variables?

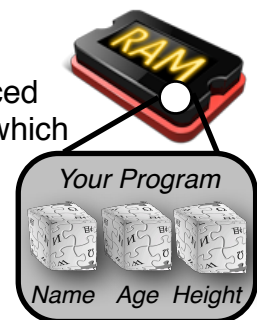
## Implementation

Let's talk about variables as they are **very** important in programming.

To put it simply, a variable is like a "box" into which data can be placed whilst a program is **running**. We give them names (identifiers) which suggest or give us a clue as to what data is being held in the variable.

Variables can be store **different types** of **data**, for example:

- **Text** (known as **strings**), e.g. *Steven, Jim, or Lisa* etc.
- **Real numbers**, (numbers with a **decimal point**) e.g. *3.14, 5.7 or 11.16*, etc.
- **Integer numbers**, (**whole** numbers) e.g. *5, 7 or 102*, etc.
- **Two state values** (known as **boolean**), e.g. *Yes/No, True/False, 1/0*, etc.



Variables are **identifiers in RAM** used to store **data** in a running program.

Here are the **variables** you will use in your first program:

**global** `room_length, room_breadth, room_height, room_volume`

Some languages allow variables to be Setup at **any point** in a program. Other languages like LiveCode require **global variables** to be declared at the **start** of the program before they can be used.

The **advantages** of **declaring variables** at the **start** are as follows:

- It allows the translator program to **reserve suitable areas of memory** to hold the data structures which will subsequently be used by the program.
- The declaration of variables serves as good **discipline** to programmers because they have to create a **list** which details the **name** and **purpose** of **each variable** used in their program.

## Variable Rules

Variables **cannot** contain any **spaces** and must **not** be a **reserved command** in LiveCode. You can tell if a variable has been accepted as it will appear in **black font** when it is typed into the text editor as shown below:

**ask** "Please enter the length of the room in metres"

**put** it **into** `room_length` ← This is the variable



The ampersand **separates** both the **variable** and the **text** to be printed on the screen. Two ampersands **&&** together will also include a single space when the text is printed. For example the following code:

**put** "The volume of this room is" `&&room_volume&&` "cubic metres." **into** field "output"

....will produce:

"The volume of this room is 3000 cubic metres."

# Classification of Variables

Variables fall into **two** main types. The type of a variable determines **where** it can be **used** in a **program**.

The **two** main types of variable are **local variables** and **global variables**. A description of each is given below. It is important that you understand the difference as you will gain experience of using **both types** of **variable** when you are programming.

## Local Variables



A **local variable** is one which only exists within **one subroutine, function or procedure**.

Local variables are **created** when the subroutine is called (run) and are then **destroyed** when the subroutine **terminates**. They **cannot** be accessed or assigned a value except within that **subroutine**.

The example below shows the use of a local variable:

```
on get_users_name
  // Setup the local variable to be used in this subroutine
  local key_pressed

  repeat until key_pressed = "Y" or key_pressed = "y"
    ask "Please enter your name"
    put it into the_name_of_person
    ask "Are you happy with the name entered? (Y or y for yes)"
    put it into key_pressed
  end repeat
end get_users_name
```

In the subroutine **get\_users\_name**, the local variable **key\_pressed** is created. The purpose of this variable is to check whether or not the user is happy with the name that they have entered by keying in "Y" or "y", otherwise the program will keep looping. This local variable is unique to this subroutine and **cannot** be used in any other subroutine.

The **advantage** of using **local variables** is that it **prevents** them from being used **elsewhere** in the program and possibly having their **contents accidentally changed**.

## Global Variables



A **global variable** is one which can be **accessed** and **altered** from **any** part of the program, even from another script/event so long as it is **declared** at the very **start**.

Global variables should **always** be used with **care** as their values may accidentally change if the programmer forgets that they have already used them in another subroutine. The example below shows the setting up of a series of global variables in LiveCode:

```
// Setup the global variables to be used in this event
global name_of_person, age_of_person, address_of_person
```

In the code snippet above **three global variables** have been created. These variables can be used in **any subroutine** and in **any LiveCode event** so long as they are **declared** at the **start** of the **event** in the same way as shown above.

# Parameter Passing

## What is a Parameter?

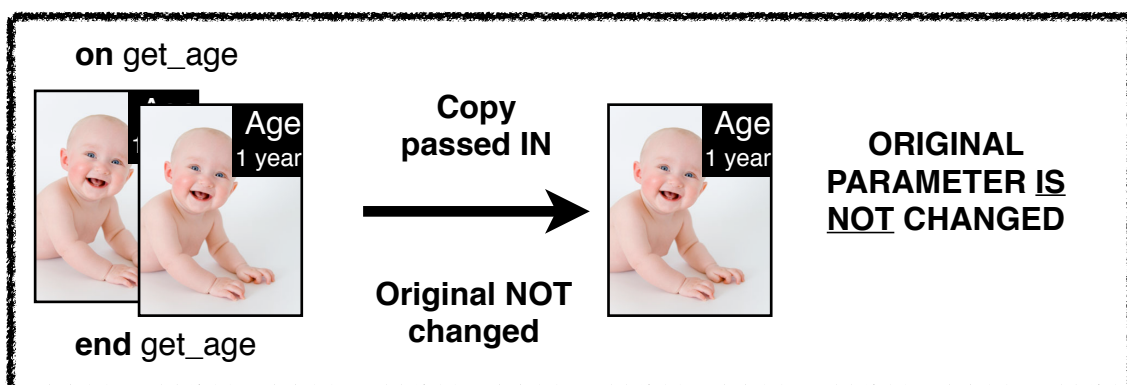
A **parameter** can either be a **variable** or an **array**. When a parameter is used, it can be passed into a sub-routine and **not changed** (passes by value) or passed into a subroutine and **changed** (passed by reference). Only **global variables** and **arrays** can be parameter passed because (as you have already learned), **only** a parameter that is **global** can be used in **more** than **one subroutine**.

For Higher Computing, you need to demonstrate both parameter passing by **value** and by **reference** within the programs you create. It is **vital** you **understand** how it works. Parameter passing works in the **same** way as the **data flow** you do during the **design**.

## Parameter Passing by Value

Passing a parameter by **value** is used when a parameter is needed in a subroutine but its value **is not** going to **change** in the **subroutine**.

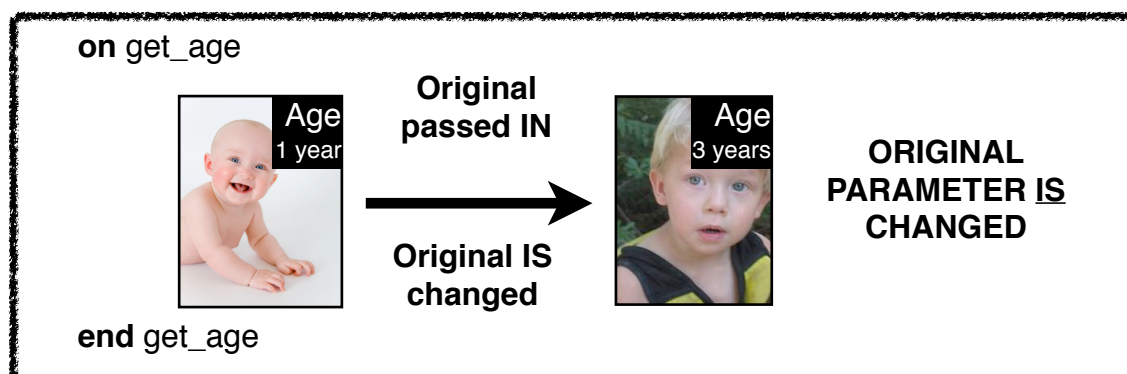
The subroutine will be passed a **copy** of the original parameter, so that the original parameter remains unchanged.



## Parameter Passing by Reference

Passing a parameter by **reference** is used when a parameter is needed in a subroutine and its value **is** going to **change** in the **subroutine** when it is passed in.

The subroutine will be passed the original parameter and any changes made in the subroutine **will** result in a **change** to the original value(s) held within the parameter.





# Parameter Passing (an example)

For Higher Computing, you need to demonstrate **both** of these methods of **parameter passing** within **all** programs you create. Study the program below carefully. This program calculates the volume of a room and it will be the first program you create. It **includes** parameter passing indicated in **highlighted sections**:

// Here are our global parameters (variables) to be used in this event.

**global** room\_length, room\_breadth, room\_height, room\_volume

on mouseUp

// After the names of each subroutine, we include all the global parameters used

// within that subroutine separated by a comma.

    initialise

    get\_room\_measurements room\_length, room\_breadth, room\_height

    calculate\_room\_volume room\_length, room\_breadth, room\_height, room\_volume

    display\_room\_volume room\_volume

end mouseUp

on initialise

// The first subroutine does not normally include any parameter passing as this

// involves setting up the parameters to null or 0.

    put 0 into room\_length

    put 0 into room\_breadth

    put 0 into room\_height

    put 0 into room\_volume

end initialise

// After the subroutine name below, you will notice that the parameter names have

// an @ symbol before their name. This indicates that the parameters are being

// passed into this subroutine by reference, in other words, they are changing from 0

// (initialised state) to whatever the user enters.

on get\_room\_measurements @room\_length, @room\_breadth, @room\_height

    ask "Please enter the length of the room in metres"

    put it into room\_length

    ask "Please enter the breadth of the room in metres"

    put it into room\_breadth

    ask "Please enter the height of the room in metres"

    put it into room\_height

end get\_room\_measurements

// After the subroutine name below you will notice that the most of the parameters

// are now being passed by value (no @ sign before the name). This is because the

// values have already been assigned in the previous subroutine and we do not want

// them to change when passed into this subroutine.

//

// The only value which is passed by reference is room\_volume as it will be changed

// from its initialised state of 0 to the result of the calculation below.

on calculate\_room\_volume room\_length, room\_breadth, room\_height, @room\_volume

    put (room\_length \* room\_breadth \* room\_height) into room\_volume

end calculate\_room\_volume

// The only parameter which passed into this subroutine is room\_volume. This is

// passed by value as it is the result of the calculation in the previous subroutine and

// we do not want the parameters value to change.

on display\_room\_volume room\_volume

    put "The volume of this room is" &&room\_volume&& "cubic metres." into field "output"

end display\_room\_volume

# LiveCode

LiveCode is a modern programming environment that has been created by an Edinburgh-based company called Runtime Revolution, [www.runrev.com](http://www.runrev.com).

LiveCode is advertised as being a **very high level language** and is considered to be **even closer** to the way we speak and write as opposed to the sometimes **complex commands** and **syntax** used in other high-level programming environments.

Users can use LiveCode to create **any** type of program. This could range from a simple application which performs addition to a more advanced game application that could be run on a desktop computer or mobile phone.

LiveCode is an **event-driven programming language** which means that it involves the triggering of **events** such as a mouse click on a button or text entry into an output field.

The LiveCode programming environment can run on a **variety** of operating system **platforms**. This includes a **PC** running Windows XP, Vista, Windows 7 or Linux as well as on a **Mac** running OS X.

At least **400MB** of **hard disk** space and **256MB** of **RAM** is required in order for the programming language to run.

The LiveCode programming environment has already been **installed** in the **Applications** folder:



You will need to **copy** the **LiveCode Programming Tasks** folder from the **resources** area of the server to **your own programming** folder within your user space on the server. This folder contains the Intermediate 2 livecode stacks for all 10 tasks that you will do during this programming unit.

Copy the **LiveCode Programming Tasks** folder from the server **now** and make sure you **work** from **this folder** from **now on**. It is in:

**Resources > Higher > Software Development**



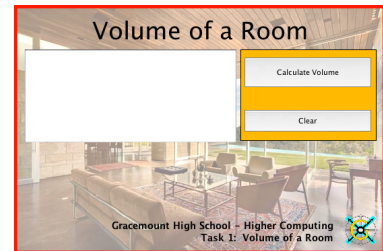
LiveCode  
Programming Tasks



## Task 1: Volume of a Room

### Specification

A program is required to calculate the volume of a room. The user will be asked for the length, breadth and height of the room in metres and then once calculated, the program will display the volume of the room in cubic metres.



### Design: Pseudocode for “Calculate Room Volume” Button

#### Stepwise Design *(the main steps of the program with data flow)*



1. Setup the global variables
2. Initialise variables
3. Get room measurements      **In/Out:** room\_length, room\_breadth, room\_height
4. Calculate room volume      **In:** room\_length, room\_breadth, room\_height      **In/Out:** room\_volume
5. Display room volume      **In:** room\_volume

#### Stepwise Refinement *(the main steps further refined into smaller steps)*

1. **Setup the global variables**
  - 1.1 Setup room\_length, room\_breadth, room\_height and room\_volume as global variables
2. **Initialise variables**
  - 2.1 Put 0 into room\_length, room\_breadth, room\_height and room\_volume
3. **Get room measurements**
  - 3.1 Ask the user for the length of the room in metres
  - 3.2 Put it into the variable room\_length
  - 3.3 Ask the user for the breadth of the room in metres
  - 3.4 Put it into the variable room\_breadth
  - 3.5 Ask the user for the height of the room in metres
  - 3.6 Put it into the variable room\_height
4. **Calculate room volume**
  - 4.1 Put the room\_length \* room\_breadth \* room\_height into the variable room\_volume
5. **Display room volume**
  - 5.1 Put a message telling the user the volume in cubic metres using the variable room\_volume in the field “output”

### Implementation

After reading through the above design carefully, you are now ready to begin producing your program code.

Key the code in over the page **carefully** and **correct** any coding errors that you make.

## Task 1: Volume of a Room

### Implementation (continued)

Open the “**Volume of a Room**” stack. It can be found in:

[LiveCode Programming Tasks > 1...Volume of a Room.livecode](#)

Enter the script below carefully into the **Calculate Volume** button. Check that the program works correctly by keying in some test data. See if the **same result** is produced if you key in the same numbers using a **calculator**.



```
// Setup the global variables to be used in this event
global room_length, room_breadth, room_height, room_volume

on mouseUp
  initialise
  get_room_measurements room_length, room_breadth, room_height
  calculate_room_volume room_length, room_breadth, room_height, room_volume
  display_room_volume room_volume
end mouseUp

on initialise
  // Initialise the global variables to 0
  put 0 into room_length
  put 0 into room_breadth
  put 0 into room_height
  put 0 into room_volume
end initialise

on get_room_measurements @room_length, @room_breadth, @room_height
  // Get the room measurements from the user
  ask "Please enter the length of the room in metres"
  put it into room_length
  ask "Please enter the breadth of the room in metres"
  put it into room_breadth
  ask "Please enter the height of the room in metres"
  put it into room_height
end get_room_measurements

on calculate_room_volume room_length, room_breadth, room_height, @room_volume
  // Calculate the volume of the room
  put (room_length * room_breadth * room_height) into room_volume
end calculate_room_volume

on display_room_volume room_volume
  // Display the volume of the room using the result within the room_volume variable
  put "The total volume of this room is" &&room_volume&& "cubic metres." into field "output"
end display_room_volume
```

# So, what have we learned so far?

PAUSE PAUSE PAUSE PAUSE PAUSE PAUSE PAUSE PAUSE PAUSE PAUSE

The LiveCode program area has three areas:

1. The **variable** list - lists all variables used in the program
2. The **event** list - this is a list of **all subroutines** which are run when the event is triggered by the user.
3. The **subroutines** - contain the **lines of code** to be **executed**.



**ASK** is a command that allows the programmer to ask the user a question or ask the user for a response. For example:

```
ask "Please enter the length of the room in metres"
```



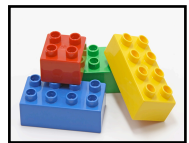
**PUT** is a command that allows the programmer to transfer the users response (it) into a meaningful **variable**. For example:

```
put it into room_length
```



**//** are used to put **internal commentary** into a program or to space out different parts of the program to make it easier to read. For example:

```
// Display the volume of the room room
```



**on** and **end** are used to **start** and **end** of a subroutine. A subroutine must be started and ended, for example:

```
on display_room_volume room_volume
  put "The room volume is" &room_volume into field "output"
end display_room_volume
```

One way to get one or more lines of code to repeat is by using a **loop**. The **two** main types of loop are a **fixed** loop and a **conditional** loop.

## Fixed LOOP

A **REPEAT WITH loop** can be used to repeat a piece of code as many times as the user sets it up for. In the example below, the loop is **fixed** at repeating the message "Hello World!" **4 times only**.

```
repeat with loop = 1 to 4
  put "Hello Word!"
end repeat
```

## Conditional LOOP

A **REPEAT UNTIL loop** can be used to repeat a line of code until a certain **condition** is met. In the example below, the loop will **not** finish **until** the user enters a **valid number** between **0 and 100**. This is the **condition**.

```
ask "Please enter a number between 0 and 100."
put it into number
repeat until number >= 0 and number <= 100
  ask "Invalid number. Please re-enter a number between 0 and 100."
  put it into number
end repeat
```

## Task 2: Music Shop Takings

### Specification

A program is required take in the number of CD's, DVD's and Blu-Ray Disks sold over the course of a day. The program will then find the combined total takings of CD's (£7.99), DVD's (£10.99) and Blu-Ray Disks (£14.99) sold and display this in an output field.



### Design: Pseudocode for “Go” Button

#### Stepwise Design (the main steps of the program)

1. Setup the global variables
2. Initialise variables
3. Get Number of Items Sold **In/Out:** cds\_sold, dvds\_sold, blurays\_sold
4. Calculate Total Takings **In:** cds\_sold, dvds\_sold, blurays\_sold **In/Out:** total\_takings
5. Display Total Takings **Out:** cds\_sold, dvds\_sold, blurays\_sold, total\_takings



#### Stepwise Refinement (the main steps further refined into smaller steps)

##### 1. Setup the global variables

- 1.1 Setup cds\_sold, dvds\_sold, blurays\_sold and total\_takings as global variables

##### 2. Initialise variables

- 2.1 Put 0 into cds\_sold, dvds\_sold, blurays\_sold and total\_takings

##### 3. Get Number of Items Sold

- 3.1 Ask the user for the number of CD's sold
- 3.2 Put it into the variable cds\_sold
- 3.3 Ask the user for the number of DVD's sold
- 3.4 Put it into the variable dvds\_sold
- 3.5 Ask the user for the number of Blu-Ray's sold
- 3.6 Put it into the variable blurays\_sold

##### 4. Calculate Total Takings

- 4.1 Put  $\text{cds\_sold} * 7.99 + \text{dvds\_sold} * 10.99 + \text{blurays\_sold} * 14.99$  into the variable total\_takings

##### 5. Display Total Takings

- 5.1 Set the number format to pounds and pence (00.00)
- 5.2 Put a message showing user the number of CD's sold using the variable cds\_sold in line 1 of the field “output1”
- 5.3 Put a message showing user the number of DVD's sold using the variable dvds\_sold in line 2 of the field “output1”
- 5.4 Put a message showing user the number of Blu-Ray's sold using the variable blurays\_sold in line 3 of the field “output1”
- 5.5 Put a message to the user showing them the total profit for that day using the variable total\_takings in field “output2”

## Task 2: Music Shop Takings

### Implementation

Open the “**Music Shop Takings**” stack. It can be found in:

[LiveCode Programming Tasks > 2...Music Shop Takings.livecode](#)

Copy the script below carefully into the “**Go**” button. Check that the program works correctly by keying in some test data. See if the same result is produced if you key in the **same** numbers using a **calculator**.



```
// Setup the global variables to be used in this event
```

```
global cds_sold, dvds_sold, blurays_sold, total_takings
```

```
on mouseUp
```

```
  initialise
```

```
  get_number_of_items_sold cds_sold, dvds_sold, blurays_sold
```

```
  calculate_total_takings cds_sold, dvds_sold, blurays_sold, total_takings
```

```
  display_total_takings cds_sold, dvds_sold, blurays_sold, total_takings
```

```
end mouseUp
```

```
on initialise
```

```
  // Initialise the variables
```

```
  put 0 into cds_sold
```

```
  put 0 into dvds_sold
```

```
  put 0 into blurays_sold
```

```
  put 0 into total_takings
```

```
end initialise
```

```
on get_number_of_items_sold @cds_sold, @dvds_sold, @blurays_sold
```

```
  // Get the number of CDs, DVDs and Blu-Ray Disks sold
```

```
  ask "Please enter the number of CD's sold today: "
```

```
  put it into cds_sold
```

```
  ask "Please enter the number of DVD's sold today: "
```

```
  put it into dvds_sold
```

```
  ask "Please enter the number of Blu-Ray's sold today: "
```

```
  put it into blurays_sold
```

```
end get_number_of_items_sold
```

```
on calculate_total_takings cds_sold, dvds_sold, blurays_sold, @total_takings
```

```
  // Calculate the total takings by taking the amount of items sold by the user
```

```
  put cds_sold * 7.99 + dvds_sold * 10.99 + blurays_sold * 14.99 into total_takings
```

```
end calculate_total_takings
```

```
on display_total_takings cds_sold, dvds_sold, blurays_sold, total_takings
```

```
  // Display the quantity of each type of produce sold during the day
```

```
  put cds_sold into line 1 of field "output1"
```

```
  put dvds_sold into line 2 of field "output1"
```

```
  put blurays_sold into line 3 of field "output1"
```

```
  // This function sets the output of the total takings to two decimal places
```

```
  set numberformat to "00.00"
```

```
  // Display the total cost
```

```
  put "Today you have made a total of £" & total_takings into field "output2"
```

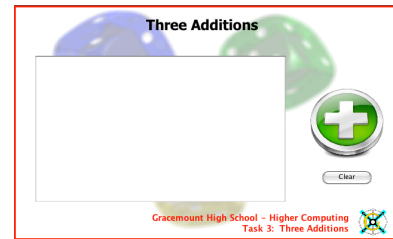
```
end display_total_takings
```



## Task 3: Three Additions

### Specification

A program is required to test basic addition. The program will ask the user for their name, check to see if it's acceptable, then ask the user to answer **three** simple **additions** of two numbers (between **0** and **9**). The answer will then be checked by the program and a comment about the answer will be displayed.



The number correct out of three along with a comment should be displayed in the output field.

### Design: Pseudocode for “Plus” graphic



#### Stepwise Design (the main steps of the program with data flow)

1. Setup the Global Variables
2. Initialise variables
3. Get the Users Name    **In/Out:** name\_of\_person
4. Three Additions        **In/Out:** first\_number, second\_number, my\_answer    **Out:** name\_of\_person

#### Stepwise Refinement (the main steps further refined into smaller steps)

1. **Setup the Global Variables**
  - 1.1 Setup name\_of\_person, first\_number, second\_number, my\_answer as global variables
2. **Initialise variables**
  - 2.1 Put 0 into first\_number, second\_number and my\_answer
  - 2.2 Put "" into name\_of\_person
3. **Get the Users Name**
  - 3.1 Setup key\_pressed as a local variable
  - 3.2 **Start a Repeat loop** until the key\_pressed = "Y" or "y"
    - 3.3 Ask the user for their name
    - 3.4 Put it into name\_of\_person
    - 3.5 Ask the user if they are happy with the name entered
    - 3.6 Put it into key\_pressed
  - 3.7 **End Repeat**
4. **Three Additions**
  - 4.1 Setup number\_correct as a local variable
  - 4.2 Put 0 into number\_correct
  - 4.3 **Start a Repeat with question\_number=1 to 3**
    - 4.4 Put a random number between 1 and 9 into first\_number and second\_number
    - 4.5 Ask for the answer to first\_number + second\_number
    - 4.6 **If** the cancel button is pressed **then** exit to the top of the program
    - 4.7 Put it into my\_answer
    - 4.8 Put my\_answer into line question\_number of the field "output"
    - 4.9 **If** my\_answer = first\_number + second\_number **then**
      - 4.10 Put a pop up message to the user saying, correct, well done!
      - 4.11 Add 1 to number\_correct
    - 4.12 **Else**
      - 4.13 Put a pop up message to the user saying, wrong answer.
    - 4.14 **End If**
  - 4.15 **End Repeat**
  - 4.16 Put how many questions out of 3 the user got correct into line 5 of field "output"
  - 4.17 **If** the number\_correct is = 0 **then** put "very disappointing" into line 7 of field "output"
  - 4.18 **If** the number\_correct is = 1 **then** put "disappointing" into line 7 of field "output"
  - 4.19 **If** the number\_correct is = 2 **then** put "good work" into line 7 of field "output"
  - 4.20 **If** the number\_correct is = 3 **then** put "well done" into line 7 of field "output"



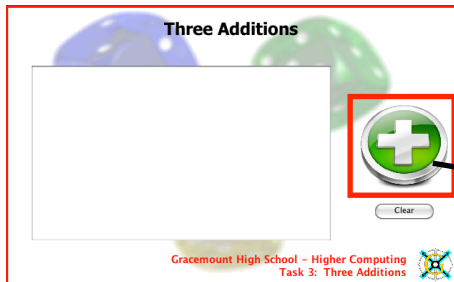
### Task 3: Three Additions

#### Implementation

Open the “**Three Additions**” stack. It can be found in:

[LiveCode Programming Tasks > 3...Three Additions.livecode](#)

Copy the script below carefully into the “**Plus**” graphic. Check that the program works correctly by keying in some test data. See if the same result is produced if you key in the same numbers using a calculator.



Plus graphic  
(a button can also be a graphic)

```
// Setup the global variables to be used in this event
global name_of_person, first_number, second_number, my_answer

on mouseUp
    initialise
    get_users_name name_of_person
    three_additions name_of_person, first_number, second_number, my_answer
end mouseUp

on initialise
    // Initialise the variables to null or 0
    put "" into name_of_person
    put 0 into first_number
    put 0 into second_number
    put 0 into my_answer
end initialise

on get_users_name @name_of_person
    // Setup a local variable to check if a key has been pressed
    local key_pressed

    // A loop is used to ask the user if they are happy with the name they have
    // entered. The loop expects either Y or y to be keyed in
    repeat until key_pressed = "Y" or key_pressed = "y"
        ask "Please enter your name"
        // If the cancel button is pressed, go back to the start of the program.
        if the result = "Cancel" then exit to top
        put it into name_of_person
        ask "Are you happy with the name entered? (Y or y for yes)"
        if the result = "Cancel" then exit to top
        put it into key_pressed
    end repeat
end get_users_name
```

The code is continued on the next page

### Task 3: Three Additions

#### Implementation (continued)

```

on three_additions name_of_person, @first_number, @second_number, @my_answer
  // Setup a local variable to keep track of the number of sums correct
  local number_correct
  put 0 into number_correct

  // This fixed loop asks the user three basic arithmetic questions
  repeat with loop = 1 to 3
    // The numbers are randomly generated between 1 and 9
    put random (9) into first_number
    put random (9) into second_number
    ask "What is" &&first_number&& "added to" &&second_number&&"?"
    if the result = "Cancel" then exit to top

    put it into my_answer

    put "So you think" &&first_number&& "added to" &&second_number&& "is"
    &&my_answer into line loop of field "output" // On the same line

    IF my_answer = first_number + second_number THEN
      answer "Correct answer, well done!"
      add 1 to number_correct
    ELSE
      answer "Wrong answer!"
    END IF
  end repeat

  put "Well" &&name_of_person& ", out of 3 you got" &&number_correct&& "correct."
  into line 5 of field "output" // On the same line

  If number_correct = 0 THEN put "You're not really good at basic arithmetic, you
  must practice more!" into line 7 of field "output" // On the same line
  If number_correct = 1 THEN put "You must practice more! Try to improve on your
  mark for next time!" into line 7 of field "output" // On the same line
  If number_correct = 2 THEN put "Good effort! Keep up the good work and try to
  get full marks next time!" into line 7 of field "output" // On the same line
  If number_correct = 3 THEN put "Full marks! Well done!" into line 7 of field
  "output" // On the same line
end three_additions

```

#### Testing

Check that the program works correctly by keying in some test data. See if the **same results** are produced if you work out the **same answers** in your head.



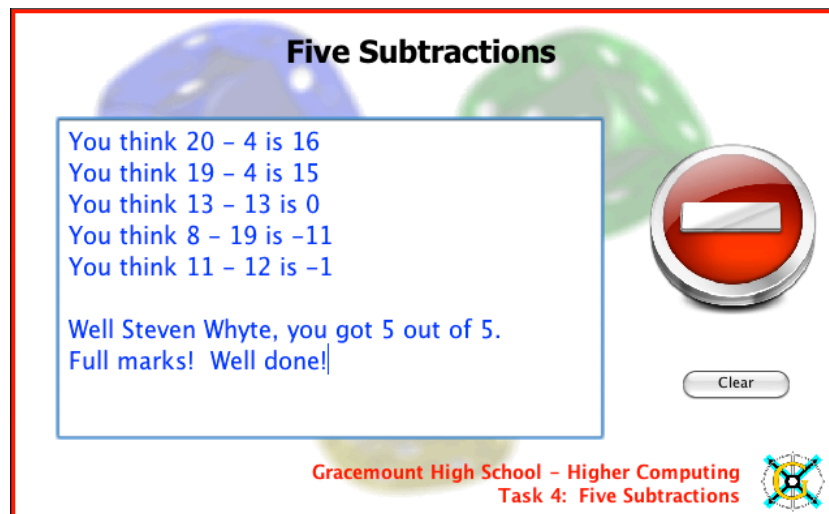
## Task 4: Five Subtractions

### Task

A program is required to test a users basic subtraction. The program will ask the user for their name, check to see if they are happy with the name entered and then ask them to answer **five subtractions** of two numbers (between **1** and **20**). Each answer will then be checked by the program and a comment about the answer will be displayed.

The **number correct** out of **five** along with a suitable comment **depending** on the **mark** they get should be displayed in the **output** field. You can make up whatever comments you like.

Sample output is shown below:



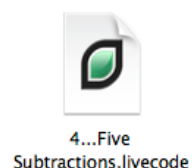
Your task is to do the following:

- Create the program script for the above problem using the code from the previous task to help (you may wish to **copy** the script and amend it).
- You **must** include **internal commentary** and **parameter passing**.
- Assign the code to the "**minus**" graphic.
- Create a **clear** button and **produce** a **simple script** to **clear** the **output** field.  
**Note.** Look at the clear script from the previous program to help you.
- **Test** that your program produces the **correct** results.
- Show the **teacher** your **working** program once **completed**.

The LiveCode stack to produce the script can be found in:

[LiveCode Programming Tasks > 4...Five Subtractions.livecode](#)

**Good Luck!**



## Task 5: Choosing Colours

### Specification

A **switch** statement can be very useful when you have a **number of possible inputs** and you want to respond **individually** to all the possibilities (**cases**).

For example: A program is required to take in a **colour** and **display** an appropriate **message** for that colour. The **card background** and **text** should also change to that colour.

If the colour entered **does not match** any of the **cases**, the program assumes the **output field is empty** and you should display a message to the user saying that there is no message for that colour.

### Design: Pseudocode for the “Ask Colour” button



#### Stepwise Design (the main steps of the program)

1. Choose Colour

#### Stepwise Refinement (the main step further refined into smaller steps)

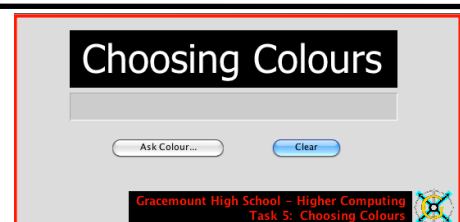
##### 1. Choose Colour

- 1.1 Setup theColour as a local variable
- 1.2 Ask the user for theColour
- 1.3 Put it into theColour
- 1.4 **Start a Switch** Control Structure using the variable theColour
- 1.5 In the **case red** is entered, change the background and font colour to **red**
- 1.6 Put a message saying blood is red into field “output”
- 1.7 **Break** out of switch statement
- 1.8 In the **case blue** is entered, **set** the background and font colour to **blue**
- 1.9 Put a message saying the sea is blue into field “output”
- 1.10 **Break** out of switch statement
- 1.11 In the **case green** is entered, **set** the background and font colour to **green**
- 1.12 Put a message saying grass is green into field “output”
- 1.13 **Break** out of switch statement
- 1.14 In the **case black** is entered, **set** the background and font colour to **black**
- 1.15 Put a message saying coal is black into field “output”
- 1.16 **Break** out of switch statement
- 1.17 In the **case yellow** is entered, **set** the background and font colour to **yellow**
- 1.18 Put a message saying the sun is yellow into field “output”
- 1.19 **Break** out of switch statement
- 1.20 **End Switch**
- 1.21 **If** the output field is empty **then**
- 1.22 **Set** the background colour to **grey** and text colour to **black**
- 1.23 Put a message saying that there is no message for that colour into field “output”
- 1.24 **End If**

### Implementation

Open the “Choosing Colors” stack. It can be found in:

[LiveCode Programming Tasks > 5...Choosing Colours.livecode](#)



## Task 5: Choosing Colours

### Implementation

Ask Colour...

Add the following script to the **Ask Colour** button and **test** that your program produces the correct results for **each colour**. After you have finished, add another **three colours** of your choice along with your own message for each colour. Use the website [www.tayloredmktg.com/rgb/](http://www.tayloredmktg.com/rgb/) to get the RGB colour code for the colours you have chosen.

```
on mouseUp
    choose_colour
end mouseUp







on choose_colour
    // Setup the local variable to be used in this subroutine
    local theColour

    // Setup the card
    put empty into field "output"
    set the backgroundColor of this card to 220,220,220
    set the textColor of field "output" to 0,0,0

    // Prompt the user for their colour
    ask "Please enter your colour"
    put it into theColour

    // Start a switch statement
    switch theColour
        // In the case that the colour is red, blue, green, black or yellow, display a message and change
        // the colour of the text and background to that colour using its RGB code.
        case "Red"
            put "Blood is red" into line 1 of field "output"
            set the backgroundColor of this card to 255,0,0
            set the textColor of field "output" to 255,0,0
            break
        case "Blue"
            put "The sea is blue" into line 1 of field "output"
            set the backgroundColor of this card to 0,0,255
            set the textColor of field "output" to 0,0,255
        case "Green"
            put "Grass is green" into line 1 of field "output"
            set the backgroundColor of this card to 85,107,47
            set the textColor of field "output" to 85,107,47
            break
        case "Black"
            put "Coal is black" into line 1 of field "output"
            set the backgroundColor of this card to 0,0,0
            set the textColor of field "output" to 0,0,0
            break
        case "Yellow"
            put "The sun is yellow" into line 1 of field "output"
            set the backgroundColor of this card to 255,255,0
            set the textColor of field "output" to 255,255,0
            break
    end switch

    // If the user enters a colour not on the list above then set the colour to grey and text to black
    // Display the following error message
    if field "output" is empty then
        set the backgroundColor of this card to 220,220,220
        set the textColor of field "output" to 0,0,0
        put "There is no message for that colour" into line 1 of field "output"
    end if
end choose_colour
```

Blues			
Color Name	RGB CODE	HEX #	Sample
Midnight Blue	25-25-112	191970	
Navy	0-0-128	000080	
Cornflower Blue	100-149-237	6495ed	
Dark Slate Blue	72-61-139	483d8b	
Slate Blue	106-90-205	6a5acd	
Medium Slate Blue	123-104-238	7b68ee	

# Arrays

**PAUSE PAUSE PAUSE PAUSE PAUSE PAUSE PAUSE PAUSE PAUSE PAUSE**

An array is a structured data type that is used for storing items of data that are **grouped** or **structured** in a particular way so that you can manage **all data items together**.

To put it simply, an array is a **variable** which can store **more than one** piece of data in it so long as it is of the same **data type**.

Like variables, arrays must be **Setup** at the start of an event. Look at and understand the example program below. It uses an array called **arrayname** and one variable called **maxstudents** which sets the **number of student names** to be **stored** in the **array** to 5.

// Setup the global array and variable to be used in this event

global arrayname, maxstudents

on mouseUp

// Maxstudents will be set to five so five names will be entered and stored in the array

put 5 into maxstudents

get\_student\_name

display\_student\_name

end mouseUp

on get\_student\_name

// Start a fixed loop which will repeat five times

// for each name to be stored in the arrayname

repeat with loop = 1 to maxstudents

// Get the students name

ask "Please enter the name of student: " & loop

put it into arrayname[loop]

end repeat

end get\_student\_name

on display\_student\_name

// Start a fixed loop

repeat with loop = 1 to maxstudents

// Put each name entered into arrayname into each

// line of the output field using loop

put arrayname[loop] into line loop of field "output"

end repeat

end display\_student\_name

The program knows that **arrayname** is an **array** because of the **[loop]** straight after it.

**[loop]** indicates the current **element** (bunk) allocated to the array when it is used in a **loop**. This can be used to store the **users data**. In this program, the loop repeats **five times** as **maxstudents** is set to **5** in advance.

So, when the loop **starts**, the user can enter the five names, similar to that below. Notice that *all data in the array are of the same type* in this case, **string** (text):

**Repeat with loop = 1 to maxstudents**

....

arrayname[1] = "Steve" - 1<sup>st</sup> pass of loop

arrayname[2] = "Dave" - 2<sup>nd</sup> pass of loop

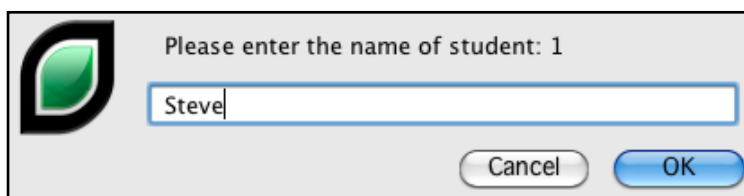
arrayname[3] = "Mike" - 3<sup>rd</sup> pass of loop

arrayname[4] = "Liam" - 4<sup>th</sup> pass of loop

arrayname[5] = "Allan" - 5<sup>th</sup> pass of loop

**End Repeat**

The contents of the array can be displayed using the variable **loop** to ensure all values in each element (bunk) are displayed in each line (**loop**) 1, 2, 3, 4, 5 of the **output field**.



After the **five** names have been entered, the following output will be produced using **arrayname**:

Steve  
Dave  
Mike  
Liam  
Allan



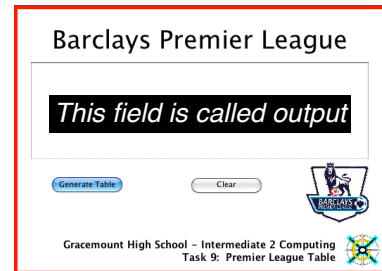
Arrays are a bit like bunk beds, one piece of data on each bunk



## Task 6: Premier League Table

### Specification

A program is required to display the first **five** teams of the Barclay's Premier League. Separate arrays should be used to store the **name** of the team, **games played**, **goal difference (gd)** and amount of **points** achieved. This information should be displayed in an output field.



### Design: Pseudocode for “Generate Table” Button

#### Stepwise Design *(the main steps of the program)*

1. Setup the Global arrays
2. Initialise
3. Read Data In/Out: arrayname, arrayplayed, arraygd, arraypoints
4. Display Data Out: arrayname, arrayplayed, arraygd, arraypoints

#### Stepwise Refinement *(the main steps further refined into smaller steps)*

##### 1. Setup the Global Arrays

- 1.1 Setup arrayname, arrayplayed, arraygd, arraypoints as the global arrays to be used in this event

##### 2. Initialise

- 2.1 Put "" into arrayname
- 2.2 Put 0 into arrayplayed, arraygd, arraypoints

##### 3. Read Data

- 3.1 Put "Manchester United", "Arsenal", "Manchester City", "Tottenham" and "Chelsea" into arrayname
- 3.2 Split arrayname by using a comma
- 3.3 Put 26, 26, 27, 26 and 26 into arrayplayed
- 3.4 Split arrayplayed by using a comma
- 3.5 Put 32, 29, 19, 9 and 24 into arraygd
- 3.6 Split arraygd by using a comma
- 3.7 Put 57, 53, 49, 47, 45 into arraypoints
- 3.8 Split arraypoints by using a comma

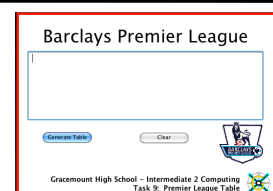
##### 4. Display Data

- 4.1 Display the field headings using the tab function in line 1 of the field "output"
- 4.2 Display a dotted line under the headings in line 2 of the field "output"
- 4.3 **Start a Repeat with loop 1 to 5**
- 4.4 Put arrayname [loop] & **tab** & arrayplayed [loop] & **tab** & arraygd [loop] & **tab** & arraypoints [loop] into line loop+2 of field "output"
- 4.5 **End Repeat**

### Implementation

Open the “Premier League Table” stack. It can be found in:

[LiveCode Programming Tasks > 6...Premier League Table.livecode](#)



## Task 6: Premier League Table

### Implementation

Assign the following script to the "Generate Table button". The purpose of this section of code is to copy the contents of the arrays into the output field at predefined points using the **tab** function.

Generate Table

```
// Setup the global arrays to be used in this event
global arrayname, arrayplayed, arraygd, arraypoints

on mouseUp
  initialise
  read_data arrayname, arrayplayed, arraygd, arraypoints
  display_data arrayname, arrayplayed, arraygd, arraypoints
end mouseUp

on initialise
  put "" into arrayname
  put 0 into arrayplayed
  put 0 into arraygd
  put 0 into arraypoints
end initialise

on read_data @arrayname, @arrayplayed, @arraygd, @arraypoints
  put "Manchester United","Arsenal","Manchester City","Tottenham","Chelsea" into arrayname
  split arrayname by comma
  put 26,26,27,26,26 into arrayplayed
  split arrayplayed by comma
  put 32,29,19,9,24 into arraygd
  split arraygd by comma
  put 57,53,49,47,45 into arraypoints
  split arraypoints by comma
end read_data

on display_data arrayname, arrayplayed, arraygd, arraypoints
  put "Name" & tab & "Games Played" & tab & "Goal Difference" & tab & "Points" into line 1 of
  field "output" // on same line
  put "-----" into line 2 of field "output" // on same line (88 -'s)
  repeat with loop = 1 to 5
    put arrayname[loop] & tab & arrayplayed[loop] & tab & arraygd[loop] & tab & arraypoints
    [loop] into line loop+2 of field "output" // on same line
  end repeat
end display_data
```

### Testing

Test that the program produces the correct results from the four arrays as shown on the screenshot to the right:

Notice that the use of the **tab** function neatly lays out the data from the arrays into columns.



Name	Games Played	Goal Difference	Points
Manchester United	26	32	57
Arsenal	26	29	53
Manchester City	27	19	49
Tottenham	26	9	47
Chelsea	26	24	45

Generate Table Clear

Gracemount High School – Intermediate 2 Computing  
Task 9: Premier League Table

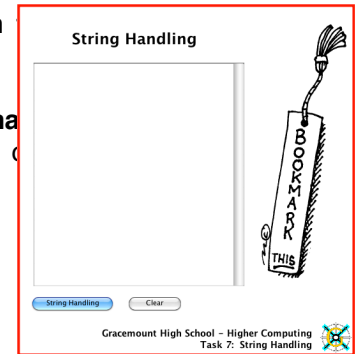
## Task 7: String Handling

As well as handling numbers, LiveCode can also perform operations on variables.

The process of joining **two** or more **strings together** is called **concatenation**. It is useful if a program is perhaps required to generate a random **username** of a certain number of **characters** contained within a users **forename** and **surname**.

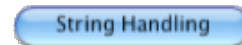
Open the “String Handling” stack. It can be found in:

[LiveCode Programming Tasks > 7...String Handling.livecode](#)



Work through **each task one** by **one** and **after** completing **each** task, **run** your program to check that your program's output matches the **expected output**. You **don't** need to include the **internal commentary** but it's important that you **understand** how each section of code works as your practical coursework may require you to make use of string handling.

Add the following script to the “String Handling” button:



```
on mouseUp
```

```
    string_handling
```

```
end mouseUp
```

```
on string_handling
```

```
    // Setup the local variables
```

```
    local first_word, second_word, complete_word, alphabet
```

```
    //
```

```
    //
```

```
    // -----
```

```
    //
```

```
    //
```

```
    // Task 1
```

```
    // Joining string variables together. This process is called concatenation.
```

```
    put "book" into first_word
```

```
    put "mark" into second_word
```

```
    put first_word into complete_word
```

```
    put second_word after complete_word
```

```
    put complete_word into line 1 of field "output"
```

```
    // RUN YOUR PROGRAM NOW....
```

```
    // -----
```

```
    //
```

```
    //
```

```
    // Task 2
```

```
    // Create the text to go into the string variable alphabet
```

```
    put "abcdefghijklmnopqrstuvwxyz" into alphabet
```

```
    //
```

```
    // -----
```

```
    //
```

```
    //
```

```
    // Task 2 (a)
```

```
    // Put character 3 of the string variable alphabet into line 3 of field output
```

```
    put char 3 of alphabet into line 3 of field "output"
```

```
    // RUN YOUR PROGRAM NOW....
```

```
    //
```

```
    // More tasks over the page.
```

The following output should be produced:

**bookmark**

The following output should be produced:

**C**

**The String Handling code is continued on the next page**

**Task 7: String Handling (continued)**

```
// -----
//
// Task 2 (b)
// Put characters 1 to 3 of the string variable alphabet into line 5 of field output
put char 1 to 3 of alphabet into line 5 of field "output"
// RUN YOUR PROGRAM NOW....
// -----
```

The following output should be produced:

**abc**

```
// -----
//
// Task 2 (c)
// Put characters 24 to 26 of the string variable alphabet into line 7 of field output
put char 24 to 26 of alphabet into line 7 of field "output"
// RUN YOUR PROGRAM NOW....
// -----
```

The following output should be produced:

**xyz**

```
// -----
//
// Task 2 (d)
// Put characters 10 to 20 of the string variable alphabet into line 9 of field output
put char 10 to 20 of alphabet into line 9 of field "output"
// RUN YOUR PROGRAM NOW....
// -----
```

The following output should be produced:

**jklmnopqrst**

```
// -----
//
// Task 2 (e)
// Put the length of the string variable alphabet into line 11 of field output
put the length of alphabet into line 11 of field "output"
// RUN YOUR PROGRAM NOW....
// -----
```

The following output should be produced:

**26**

```
// -----
//
// Task 2 (f)
// Find the position of a character in a string variable
// This example finds "c" in the string variable alphabet to produce the value of 3
put offset("c",alphabet) into line 13 of field "output"
// RUN YOUR PROGRAM NOW....
// -----
```

The following output should be produced:

**3**

```
// -----
//
// Task 3: Number to Character upper case
// Produces a random upper case value from A - Z
// Capital "A" starts at ASCII 65 + 25 other characters of alphabet
put NumToChar (random(26) + 64) into line 15 of field "output"
// RUN YOUR PROGRAM NOW....
// -----
```

The following output should be produced:

**any UPPER case (A-Z)**

```
// -----
//
// Task 4: Number to Character lower case
// Produces a random lower case value from a - z
// Lower case "a" starts at ASCII 96 + 25 other characters of alphabet
put NumToChar (random(26) + 95) into line 17 of field "output"
// RUN YOUR PROGRAM NOW....
// -----
```

The following output should be produced:

**any lower case (a-z)**

```
// -----
//
// Task 5: Character to Number
// Produces the ASCII code value for the chosen character
put CharToNum ("A") into line 19 of field "output"
// RUN YOUR PROGRAM NOW....
end string_handling
```

## Task 8: Customer Code Generator

### Task

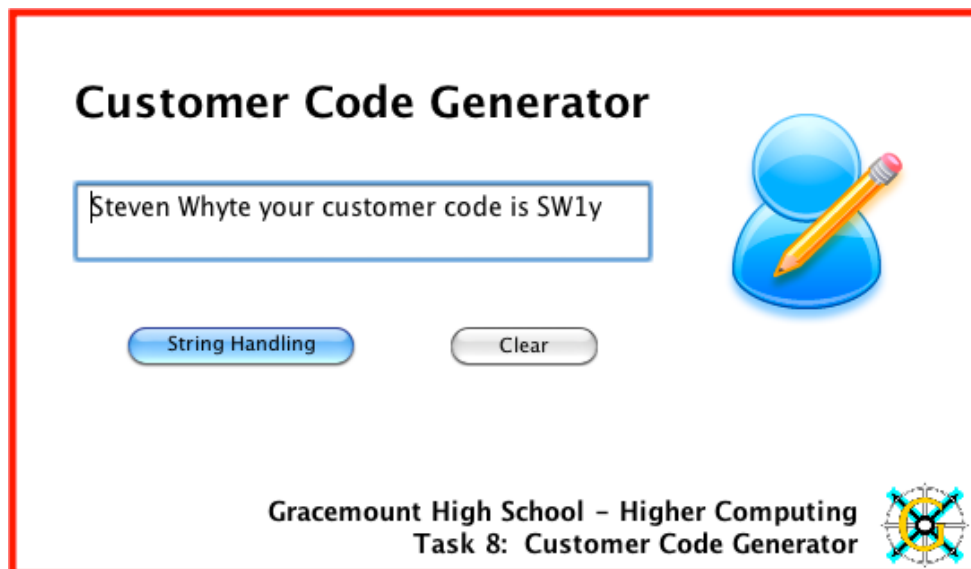
A program is required to generate a customer code. The program should **Ask** the user for their **first name** and **second name**.

Once the program has this information, the customer code should be generated.

The customer code should be made up of:

- The **first character** from both the **first name** and **second name**.
- A **random number** number between **1** and **9**.
- A **random lower case character** (a-z).

Sample output is shown below assuming the name of **Steven Whyte** has been entered:



Your task is to do the following:

- Produce the program code for this solution using the string handling examples on the previous pages.
- Create a **clear** button and **produce** a simple **script** to **clear** the **output** field.
- **Test** that your solution works by correctly producing the **customer code** as shown above.
- Show the **teacher** your **working** program once **completed**.

Your code should be placed into the “**Generate Code**” button of the “**Customer Code Generator**” stack and the output should be displayed in the **output** field.

The “**Customer Code Generator**” stack can be found in:

[LiveCode Programming Tasks > 8...Customer Code Generator.livecode](#)

**Good Luck!**



8...Customer Code  
Generator.livecode

## Task 9: Student Marks

### Specification

A program is required by a teacher to allow her to store **marks** and **grades** for her Higher Computing class. You have been asked to produce a sample program to store the details of **five** students.

This program should allow the teacher to get the **names** and **marks** of the three main topics studied at Higher level. Each mark should be **validated** as **whole numbers** between **0** and **30** (*input validation algorithm*).

Once these details have been keyed in, the program should work out the **percentage mark** and **final grade** based on the student's **percentage** mark. All of these details should then be displayed appropriately in a field called **output1**.

The program should also allow the teacher to:

- **Count** the **occurrences** of each **grade** A, B, C, D and F (*count occurrences algorithm*).
- **Search** on a **student name** (*linear search algorithm*).
- **Find** the **student** with the **highest percentage** (*find maximum algorithm*).

These details will be displayed in a field called **output2**. Sample output from the program is shown below. You may wish to use the **same** test data when it comes to **testing** your program.

This field is called **output1**

### Higher Computing Marks

Displaying All Students

Student Name	Systems Mark	Software Mark	Multimedia Mark	Percentage	Grade
Steven Whyte	12	18	20	56%	C
Allan Drain	24	25	20	77%	A
James McKay	28	27	29	93%	A
Kym Munro	10	8	8	29%	F
John King	15	16	14	50%	C

The number of students who have obtained a Grade A is: 2  
 The number of students who have obtained a Grade B is: 0  
 The number of students who have obtained a Grade C is: 2  
 The number of students who have obtained a Grade D is: 0  
 The number of students who have obtained a Grade F is: 1

The student with the highest percentage is James McKay with a percentage of 93%.

Get Student Details

Count Student Grades

Highest Percentage Mark

Clear

Display all Students

Find a Student

This field is called **output2**

Gracemount High School – Higher Computing  
Task 9: Higher Computing Marks

Read through the **design** of **Get Student Details** over the page to understand what is involved and then key in the script for this event. The script is supplied for you on pages **29** and **30**.



## Task 9: Student Marks

### Design for “Get Student Details” Graphic



#### Stepwise Design *(the main steps of the program with data flow)*

1. Setup
2. Get Student Details      **In:** maxstudents  
   **In/Out:** arrayname, arraycs, arraysdp, arraymm, check\_number
3. Calculate Percentage      **In:** maxstudents, arraycs, arraysdp, arraymtm  
   **In/Out:** arraypercentage
4. Get Grade      **In:** maxstudents, arraypercentage  
   **In/Out:** arraygrade
5. Display Details      **In:** maxstudents, arrayname, arraycs, arraysdp, arraymm,  
   arraypercentage, arraygrade
6. Validate      **In:** check\_number

#### Stepwise Refinement *(the main steps further refined into smaller steps)*

1. **Setup**
  - 1.1 Setup arrayname, arraycs, arraysdp, arraymm, arraypercentage, arraygrade as global arrays
  - 1.2 Setup maxstudents and check\_number as global variables
  - 1.3 Put the value of 5 into the variable maxstudents
  - 1.4 Clear the “heading”, “output1” and “output2” fields
  - 1.5 Put the text “Enter Student Details” into the field “heading”
2. **Get Student Details**
  - 2.1 **Start a Repeat with loop** = 1 to maxstudents
  - 2.2 Ask for the students name
  - 2.3 **If** the user selects the cancel button **then** exit to the top of the program
  - 2.4 Put it into arrayname[loop]
  - 2.5 Ask for the students Computer Systems Mark (0-30)
  - 2.6 **If** the user selects the cancel button **then** exit to the top of the program
  - 2.7 Put it into check\_number
  - 2.8 Call the validation function
  - 2.9 Put check\_number into arraycs[loop]
  - 2.10 Ask for the students Software Development Mark (0-30)
  - 2.11 **If** the user selects the cancel button **then** exit to the top of the program
  - 2.12 Put it into check\_number
  - 2.13 Call the validation function
  - 2.14 Put check\_number into arraysdp[loop]
  - 2.15 Ask for the students Multimedia Mark (0-30)
  - 2.16 **If** the user selects the cancel button **then** exit to the top of the program
  - 2.17 Put it into check\_number
  - 2.18 Call the validation function
  - 2.19 Put check\_number into arraymm[loop]
  - 2.20 **End Repeat**

The design is continued on the next page

## Task 9: Student Marks

### Design for “Get Student Details” Graphic (continued)



#### 3. Calculate Percentage

- 3.1 **Start a Repeat with loop** = 1 to maxstudents
- 3.2 Put (arraycs[loop] + arraysdp[loop] + arraymm[loop]) / by 90 \* by 100 into arraypercentage[loop]
- 3.3 **End Repeat**

#### 4. Get Grade

- 4.1 **Start a Repeat with loop** = 1 to maxstudents
- 4.2 **If** the arraypercentage[loop] is greater than 70 **then** put “A” into arraygrade[loop]
- 4.3 **If** the arraypercentage[loop] is between 60 **and** 69 **then** put “B” into arraygrade[loop]
- 4.4 **If** the arraypercentage[loop] is between 50 **and** 59 **then** put “C” into arraygrade[loop]
- 4.5 **If** the arraypercentage [loop] is between 40 **and** 49 **then** put “D” into arraygrade[loop]
- 4.6 **If** the arraypercentage[loop] is less than 40 **then** put “F” into arraygrade[loop]
- 4.7 **End Repeat**

#### 5. Display Details

- 5.1 Set the number format to 0
- 5.2 Put the column headings of “Student Name” **tab**, “Systems Mark”, **tab**, “Software Mark”, **tab**, “Multimedia Mark”, **tab**, “Percentage”, **tab**, “Grade” into line 1 of field “output1”
- 5.3 **Start a Repeat with loop** 1 to maxstudents
- 5.4 Put arrayname[loop] & **tab** & arrayc[loop] & **tab** & arraysdp [loop] & **tab** & arraymm[loop] & **tab** & arraypercentage[loop] & **tab** & arraygrade[loop] into line loop+3 of field “output1”
- 5.5 **End Repeat**

#### 6. Validate

- 6.1 **Start a Repeat until** check\_number is between 0 **and** 30 **and** is an integer
- 6.2 Ask the user to re-enter the mark if it is invalid
- 6.3 **If** the user selects the cancel button **then** exit to the top of the program
- 6.4 Put it into check\_number
- 6.5 **End Repeat**

#### Input Validation Algorithm

You must memorise the **structure** of this **algorithm** as you might be asked it in the exam.

Please **READ** the following before you begin the first script.

After carefully reading through the design. You should begin to code the script for the button called “Get Student Details”. Key in all of the code over the page **carefully**.

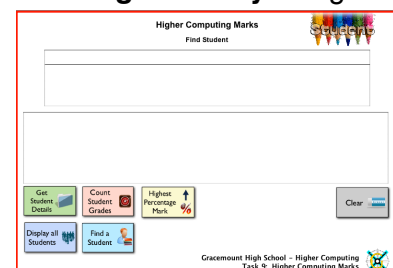
**Note.** You **do not** need to include **internal commentary** at this point. The comments are only there to help you understand what is going on.

You will however need to produce internal commentary when it comes to completing your SQA coursework.

After completing **each** event, you should **test** that your program is **working correctly** using the supplied **test data**.

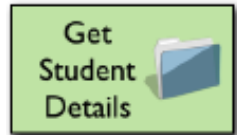
Open the “**Higher Computing Marks**” stack. It can be found in:

[LiveCode Programming Tasks > 9...Higher Computing Marks.livecode](#)



## Task 9: Student Marks

### Implementation: Script “Get Student Details”



Key the following code into the **Get Student Details** button. You **don't** need to include the **internal commentary**, it is only there to help you understand what is going on.

```
// Setup the global arrays and variables to be used in this event
global arrayname, arraycs, arraysdp, arraymm, arraypercentage, arraygrade, maxstudents, check_number

// When the mouse up event is detected on this button, execute following subroutines
on mouseUp
    set_up maxstudents
    get_student_details maxstudents, arrayname, check_number, arraycs, arraysdp, arraymm
    calculate_percentage maxstudents, arraycs, arraysdp, arraymm, arraypercentage
    get_grade maxstudents, arraypercentage, arraygrade
    display_details maxstudents, arraycs, arraysdp, arraymm, arraypercentage, arraygrade
    validate check_number
end mouseUp

on set_up @maxstudents
    put 5 into maxstudents // 5 students maximum
    put empty into field "output1" // Clear the fields
    put empty into field "output2"
    put empty into field "heading"
    put "Enter Student Details" into field "heading" // Display heading "Enter Student Details"
end set_up

on get_student_details maxstudents, @arrayname, @check_number, @arraycs, @arraysdp, @arraymm
    repeat with loop = 1 to maxstudents // Loop for 1 to 5 students

        // Get the students name
        ask "Please enter the name of student: " & loop
        if the result = "Cancel" then exit to top // If the cancel button is pressed, exit to top
        put it into arrayname[Loop]

        // Get the students validated Computer Systems mark
        ask "Please enter " & arrayname[Loop] & "'s mark for Computer Systems out of 30: "
        if the result = "Cancel" then exit to top
        put it into check_number
        validate // Start the validation function at the bottom of the event
        put check_number into arraycs[Loop] // Put the validated number into the array

        // Get the students validated Software Development mark
        ask "Please enter " & arrayname[Loop] & "'s mark for Software Development out of 30: "
        if the result = "Cancel" then exit to top
        put it into check_number
        validate // Start the validation function at the bottom of the event
        put check_number into arraysdp[Loop] // Put the validated number into the array

        // Get the students validated Multimedia Technology mark
        ask "Please enter " & arrayname[Loop] & "'s mark for Multimedia out of 30: "
        if the result = "Cancel" then exit to top
        put it into check_number
        validate // Start the validation function at the bottom of the event
        put check_number into arraymm[Loop] // Put the validated number into the array
    end repeat
end get_student_details
```

The code is continued on the next page

## Task 9: Student Marks

```

on calculate_percentage maxstudents, arraycs, arraysdp, arraymt, @arraypercentage
  repeat with loop = 1 to maxstudents // Loop for 1 to five students
    // Calculate the students percentage mark out of the three tests
    put (arraycs[loop] + arraysdp[loop] + arraymt[loop]) / 90 * 100 into arraypercentage[loop]
  end repeat
end calculate_percentage

on get_grade maxstudents, arraypercentage, @arraygrade
  // Use of multiple IF's to determine what grade a student gets based on their overall percentage
  repeat with loop = 1 to maxstudents // Loop for 1 to 5 students
    IF arraypercentage[loop] >= 70 then put "A" into arraygrade[loop]
    IF arraypercentage[loop] >= 60 AND arraypercentage[loop] <= 69 then put "B" into arraygrade[loop]
    IF arraypercentage[loop] >= 50 AND arraypercentage[loop] <= 59 then put "C" into arraygrade[loop]
    IF arraypercentage[loop] >= 40 AND arraypercentage[loop] <= 49 then put "D" into arraygrade[loop]
    IF arraypercentage[loop] < 40 then put "F" into arraygrade[loop]
  end repeat
end get_grade

on display_details maxstudents, arraycs, arraysdp, arraymt, arraypercentage, arraygrade

  set numberformat to "0" // Set the format of any numbers displayed to 0
  // Display the headings
  put "Student Name" & tab & "Systems Mark" & tab & "Software Mark" & tab & "Multimedia Mark" & tab &
    "Percentage" & tab & "Grade" into line 1 of field "output1" // On the same line

  repeat with loop = 1 to maxstudents // Loop for 1 to 5 students
    // Put the array data into field "output1"
    put arrayname[loop] & tab & arraycs[loop] & tab & arraysdp[loop] & tab & arraymt[loop] & tab &
      arraypercentage[loop] & "%" & tab & arraygrade[loop] into line loop+2 of field "output1" // Same line
  end repeat

  disable image "buttonGetStudents" // Once all details are displayed, disable this button.
  // It will be enabled when the user selects the clear button

end display_details

on validate_check_number
  // ***Input Validation***
  // The validation function will ensure the user has entered a whole number between 1 and 30
  repeat until check_number >= 0 and check_number <= 30 and check_number is an integer
    ask "You have entered an invalid guess, please enter a whole number between 0 and 30."
    if the result = "Cancel" then exit to top
    put it into check_number
  end repeat
end validate

```

## Testing

You should now test that your program is working correctly. Key in the following **names** and **marks** for the **three** assessments below. Check that your **percentage mark** and **grade** is the **same** as below.

If they are the same then your **percentage** and **grade** have been **calculated correctly** and your program **works**.

Student Name	Systems Mark	Software Mark	Multimedia Mark	Percentage	Grade
Steven Whyte	30	20	10	67%	B
Allan Drain	30	28	25	92%	A
David Beckham	10	5	15	33%	F
Edward Smith	17	19	18	60%	B
Lisa Smyth	28	27	30	94%	A

## Task 9: Student Marks

### Design for “Count Student Grades” Graphic



#### Stepwise Design *(the main steps of the program with data flow)*

1. Setup
2. Count Occurrences      In: maxstudents, arraygrade

#### Stepwise Refinement *(the main steps further refined into smaller steps)*

##### 1. Setup

- 1.1 Pass in maxstudents as the global variable to be used in this event
- 1.2 Pass in arraygrade and as the global array to be used in this event
- 1.3 Clear the field “heading”
- 1.4 Put the text “Count Student Grades” into the field “heading”

##### 2. Count Occurrences

- 2.1 Setup, AGrade, BGrade, CGrade, DGrade and FGrade as local variables
- 2.2 Put 0 into all of the local variables

##### 2.3 Start a Repeat with loop 1 to maxstudents

- 2.4 If the arraygrade[loop] is equal to an “A” then add 1 to AGrade
- 2.5 If the arraygrade[loop] is equal to an “B” then add 1 to BGrade
- 2.6 If the arraygrade[loop] is equal to an “C” then add 1 to CGrade
- 2.7 If the arraygrade[loop] is equal to an “D” then add 1 to DGrade
- 2.8 If the arraygrade[loop] is equal to an “F” then add 1 to FGrade

##### 2.9 End Repeat

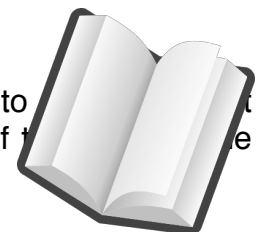
- 2.10 Put a message showing the number of pupils with an A into line 1 of field “output2” using AGrade
- 2.11 Put a message showing the number of pupils with a B into line 2 of field “output2” using BGrade
- 2.12 Put a message showing the number of pupils with a C into line 3 of field “output2” using CGrade
- 2.13 Put a message showing the number of pupils with a D into line 4 of field “output2” using DGrade
- 2.14 Put a message showing the number of pupils with an F into line 5 of field “output2” using FGrade

#### Counting Occurrences Algorithm

You must memorise the **structure** of this **algorithm** as you might be asked it in the exam.

Please **READ** the following before you begin the second script.

After carefully reading through the design above. You should begin to work on the second button called “**Count Student Grades**”. Key in all of the code on the next page **carefully** and correct your errors.



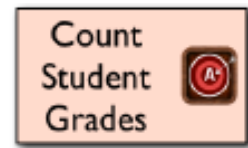
This event will count the number of **A, B, C, D** and **F** grades in the sample class of five students using the **arraygrade**. Each count of grade will then be placed into separate local variables of **AGrade, BGrade, CGrade, DGrade** and **FGrade** as shown above.

After completing the script, you should **test** that your program is working **correctly** by producing the **occurrence** of **each grade obtained**. The predicted test data is shown at the **bottom** of the **next** page.

## Task 9: Student Marks

### Implementation: Script “Count Student Grades”

Key the following code into the **Count Student Grades** Button. You **don’t** need to include the **internal commentary**, it is only there to help you understand what is going on.



```
// Allow access to global arrays and variables to be used in this event
global arraygrade, maxstudents

// When mouse up event is detected on this button then execute following subroutines
on mouseUp
    set_up
    count_occurrences maxstudents, arraygrade
end mouseUp

on set_up
    put empty into field "heading" // Clear the field
    put "Count Student Grades" into field "heading" // Display the heading "Count Student Grades"
end set_up

on count_occurrences maxstudents, arraygrade
    local AGrade, BGrade, CGrade, DGrade, FGrade // Setup local variables

    put 0 into AGrade // zero the local variables
    put 0 into BGrade
    put 0 into CGrade
    put 0 into DGrade
    put 0 into FGrade

    // ***Counting Occurrences***
    // Count the number of A, B, C, D and F grades obtained by the class
    repeat with loop = 1 to maxstudents // Loop for 1 to 5 students
        IF arraygrade[loop] = "A" then add 1 to AGrade
        IF arraygrade[loop] = "B" then add 1 to BGrade
        IF arraygrade[loop] = "C" then add 1 to CGrade
        IF arraygrade[loop] = "D" then add 1 to DGrade
        IF arraygrade[loop] = "F" then add 1 to FGrade
    end repeat

    // Print the results into field "output2"
    put "The number of students who have obtained a Grade A is: " & AGrade into line 1 of field "output2"
    put "The number of students who have obtained a Grade B is: " & BGrade into line 2 of field "output2"
    put "The number of students who have obtained a Grade C is: " & CGrade into line 3 of field "output2"
    put "The number of students who have obtained a Grade D is: " & DGrade into line 4 of field "output2"
    put "The number of students who have obtained a Grade F is: " & FGrade into line 5 of field "output2"
end count_occurrences
```

### Testing

Test that your program successfully counts the number of each occurrence of grade **A, B, C, D** and **F** and places this into the **output2** field. Your results should look the same as the results below if you are using the **same** test data as you keyed in on page 32.

```
The number of students who have obtained a Grade A is: 2
The number of students who have obtained a Grade B is: 2
The number of students who have obtained a Grade C is: 0
The number of students who have obtained a Grade D is: 0
The number of students who have obtained a Grade F is: 1
```



## Task 9: Student Marks

### Design for “Find a Student” Graphic



#### Stepwise Design (the main steps of the program with data flow)

1. Setup
2. Find Student
  - In: maxstudents
  - In: arrayname, arraycs, arraysdp, arraymt, arraypercentage, arraygrade

#### Stepwise Refinement (the main steps further refined into smaller steps)

1. **Setup**
  - 1.1 Pass in the global variable maxstudents to be used in this event
  - 1.2 Pass in the global arrays arrayname, arraycs, arraysdp, arraymm, arraypercentage, arraygrade to be used in this event
  - 1.3 Clear the field “heading”
  - 1.4 Put the text “Find Student” into the field “heading”
2. **Find Student**
  - 2.1 Setup student\_name and found as local variables
  - 2.2 Ask for the name of the student to find
  - 2.3 Put it into student\_name
  - 2.4 Set the number format to 0
  - 2.5 Put the column headings of “Student Name” & **tab** & “Systems Mark” & **tab** & “Software Mark” & **tab** & “Multimedia Mark” & **tab** & “Percentage” & **tab** & “Grade” into line 1 of field “output1”
  - 2.6 Put **false** into the boolean variable **found**
  - 2.7 **Start a Repeat with loop** = 1 to maxstudents
  - 2.8 **If** the arrayname[loop] = student\_name **then**
  - 2.9 Put arrayname[loop] & **tab** & arraycs[loop] & **tab** & arraysdp[loop] & **tab** & arraymm[loop] & **tab** & arraypercentage[loop] & **tab** & arraygrade[loop] into loop+2 of field “output1”
  - 2.10 Put **true** into the boolean variable **found**
  - 2.11 **End If**
  - 2.12 **End Repeat**
  - 2.13 **If** boolean variable found = false **then**
  - 2.14 Put a message telling the user that no students found into loop+2 of field “output1”
  - 2.15 **End If**

#### Linear Search Algorithm

You must memorise the **structure** of this **algorithm** as you might be asked it in the exam.

Please **READ** the following before you begin the third script.

After carefully reading through the design above. You should begin to write the code for the third button called “**Find a Student**”. Key in all of the code **carefully**.



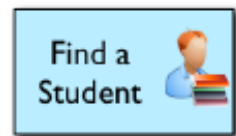
This event will **compare** the users **search** with each name in **arrayname** and display the student’s details in the **output1** field. If no name is found in arrayname then a message explaining that **no students** have been **found** is displayed. Notice that a **boolean** (true/false) variable is used to **determine** whether or not to display the **no students found** message.

After completing the script, you should **test** that your program is working correctly. The predicted test data is shown at the bottom of the next page assuming the search of “**Steven Whyte**” is entered.

## Task 9: Student Marks

### Implementation: Script “Find a Student”

Key the following code into the **Find a Student** button . You **don’t** need to include the **internal commentary**, it is only there to help you understand what is going on.



```
// Allow access to global arrays and variables to be used in this event
global maxstudents, arrayname, arraycs, arraysdp, arraymm, arraypercentage, arraygrade

// When mouse up event is detected on this button then execute following subroutines
on mouseUp
    set_up
    find_student arrayname, arraycs, arraysdp, arraymm, arraypercentage, arraygrade, maxstudents
end mouseUp

on set_up
    put empty into field "heading" // Clear the fields
    put empty into field "output1"
    put "Find Student" into field "heading" // Display heading "Find Student" for this event
end set_up

on find_student arrayname, arraycs, arraysdp, arraymm, arraypercentage, arraygrade, maxstudents
    local student_name, found // Setup local variables

    ask "Please enter the name of the student:"
    put it into student_name // User enters the name to search

    set numberformat to "0" // Set the format of any numbers displayed to 0
    // Display the headings
    put "Student Name" & tab & "Systems Mark" & tab & "Software Mark" & tab & "Multimedia Mark" & tab &
        "Percentage" & tab & "Grade" into line 1 of field "output1" // on the same line
    put false into found // Set the found boolean variable to false

    // ***Linear search***
    // Search for a student based on the name the user has entered
    repeat with loop = 1 to maxstudents // Loop for 1 to 5 students
        if arrayname[loop] = student_name then // If the names array is equal to the search name then..
            // Put the array data into field "output1"
            put arrayname[loop] & tab & arraycs[loop] & tab & arraysdp[loop] & tab & arraymm[loop] & tab &
                arraypercentage[loop] & "%" & tab & arraygrade[loop] into line loop+2 of field "output1" // on the
                                                                                                    // same line
            put true into found // if found set to true
        end if
    end repeat

    // If no match found, set found to false and then print a suitable message into field "output1"
    if found = false then put "***** No students with that name have been found
        *****" into line 3 of field "output1" // on the same line (29 stars each side)
end find_student
```

### Testing

**Test** that your program successfully **finds** a student once you **search** on their **name**. This should be displayed in the **output1** field.

Student Name	Systems Mark	Software Mark	Multimedia Mark	Percentage	Grade
Steven Whyte	30	20	10	67%	B

## Task 9: Student Marks

### Design for “Highest Percentage Mark” Graphic



#### Stepwise Design (the main steps of the program with data flow)

1. Setup
2. Find Maximum Percentage      In: maxstudents, arrayname, arraypercentage

#### Stepwise Refinement (the main steps further refined into smaller steps)

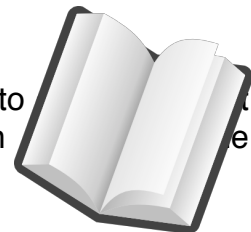
1. **Setup**
  - 1.1 Pass in maxstudents as the global variable to be used in this event
  - 1.2 Pass in arrayname and arraypercentage as the global arrays to be used in this event
  - 1.2 Clear the field “heading”
  - 1.3 Put the text “Highest Student Percentage” into the field “heading”
2. **Find Maximum Percentage**
  - 2.1 Setup maximum and position as local variables
  - 2.2 Put 0 into maximum
  - 2.3 **Start a Repeat with loop = 1 to maxstudents**
  - 2.4     **If** the arraypercentage[loop] is greater than maximum **then**
  - 2.5         Put arraypercentage[loop] into maximum
  - 2.6         Put loop into position
  - 2.7     **End If**
  - 2.8 **End Repeat**
  - 2.9 Set the number format of any number shown to a whole number (0)
  - 2.10 Put a message showing name and percentage of the student who obtained the highest percentage using the variable position into line 7 of field “output2”

#### Find Max Algorithm

You must memorise the **structure** of this **algorithm** as you might be asked it in the exam.

Please **READ** the following before you begin the fourth script.

After carefully reading through the design above. You should begin to for the fourth button called “**Highest Percentage Mark**”. Key in **carefully**.



This event will **find** and **display** the **highest percentage** mark using the **arraypercentage**.

Once the highest percentage has been found, the program will produce the **name** and **percentage mark** of the student with the **highest percentage**.

After completing the script, you should **test** that the program is working correctly. The predicted test data is shown at the **top** of the **next page**.

You should also key in the code to **clear** the **output** and **text fields**. This code is displayed at the bottom of the next page and should be assigned to the **clear** button.

## Task 9: Student Marks

### Implementation: Script “Highest Percentage Mark”

Key the following code into the **Highest Percentage Mark**. You **don’t** need to include the **internal commentary**, it is only there to help you understand what is going on. Once completed, **test** that your program correctly identifies the **student** with the **highest percentage mark**. This should be placed into **line 7** of the **output2** field.



The student with the highest percentage is Lisa Smyth with a percentage of 94%.

```
// Allow access to global arrays and variables to be used in this event
global maxstudents, arrayname, arraypercentage

// When mouse up event is detected on this button then execute following subroutines
on mouseUp
    set_up
    find_maximum_percentage maxstudents, arrayname, arraypercentage
end mouseUp

on set_up
    put empty into field "heading" // Clear the fields
    put "Highest Student Percentage" into field "heading" // Display heading "Highest Student
                                                    // Percentage" for this event
end set_up

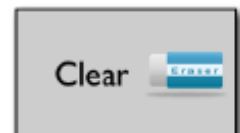
on find_maximum_percentage maxstudents, arrayname, arraypercentage
    local maximum, position // Setup local variables
    put 0 into maximum // Zero the Maximum variable

    // ***Find Maximum***
    // Find the student with the highest percentage
    Repeat with loop = 1 to maxstudents // Loop for 1 to 5 students
        If arraypercentage[loop] > maximum then // If the percentage array is greater than Maximum
            put arraypercentage[loop] into maximum // Put the value from the array into Maximum
            put loop into position // Record the position of the loop
        end if
    end Repeat

    set numberformat to "0" // Set the format of any numbers displayed to 0
    // Display the position student with the highest percentage in field "Output2"
    put "The student with the highest percentage is " & arrayname[position] & " with a percentage of " &
        arraypercentage[position] & "%." into line 7 of field "output2" // On same line
end find_maximum_percentage
```

### Implementation: Script “Clear”

Once you have tested that your highest percentage button is working, key in the following code for the clear button **carefully**. You don’t need to include the internal commentary, it is only there to help you understand what is going on.



```
// When the mouse up event is detected on this button, execute following actions
on mouseUp
    put empty into field "output1" // Clear the fields
    put empty into field "output2"
    put empty into field "heading"
    enable image "buttonGetStudents" // Enable the image button "Get Students" once the clear button
                                                    // has been pressed
end mouseUp
```

## Task 9: Student Marks

### Task

You are now going to attempt to create the script for **one** further button in the program.

This button is going to find the **lowest percentage** mark into **line 8** of the output.

The script you will enter is very similar to the one you entered before. Also use the **pseudocode** on the **next page**.

**Before** you begin creating the **script**, you need to import the image.

- Import the image “9B...Lowest Percentage Mark Graphic.png” by **importing** the graphic **as a control**, as shown above. It can be found in your **LiveCode Programming Tasks** folder.
- Double click on the imported image and give the image a **name** on the right.

**Note.** A *tooltip* is a small yellow hover box which appears when the cursor passes over an object as shown on the image above.

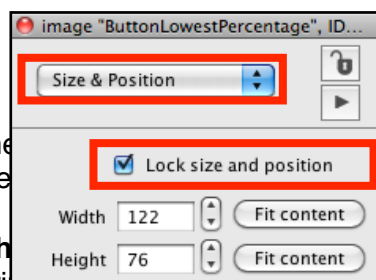
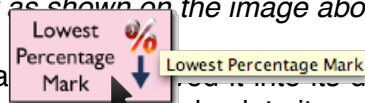
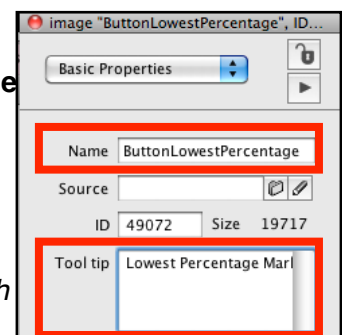
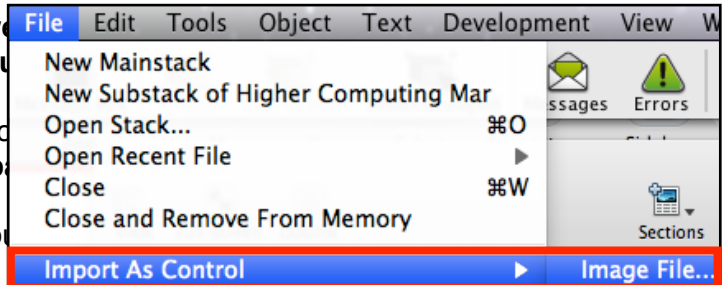
- Once you have resized the graphic to the desired position, you **must lock** its **size** and **position** to prevent it from going back to its normal size.

**Note.** To do this, double click on the graphic to bring up the properties inspector again and select “size and position”. Check the box beside “lock size and position” as shown below.

You are now ready to create the script for the button. Make sure that you **test** that your script produces the correct output in the **output field** once complete.

Remember, if you get stuck, the script to find the **lowest percentage**. Therefore, the script to find **lowest** percentage is going to be **very similar**! Use the **pseudocode** over the page to help.

**Good Luck!**



## Task 9: Student Marks

### Design for “Lowest Percentage Mark” Graphic



#### Stepwise Design (the main steps of the program with data flow)

1. Setup
2. Find Minimum Percentage      In: maxstudents, arrayname, arraypercentage

#### Stepwise Refinement (the main steps further refined into smaller steps)

1. Setup
  - 1.1 Pass in maxstudents as the global variables to be used in this event
  - 1.2 Pass in arrayname and arraypercentage as the global arrays to be used in this event
  - 1.2 Clear the field “heading”
  - 1.3 Put the text “Lowest Student Percentage” into the field “heading”

#### 2. Find Minimum Percentage

- 2.1 Setup minimum and position as local variables
- 2.2 Put 100 into minimum
- 2.3 **Start a Repeat with loop** 1 to maxstudents
- 2.4     **If** the arraypercentage[loop] is less than minimum **then**
- 2.5         Put arraypercentage[loop] into minimum
- 2.6         Put loop into position
- 2.7     **End If**
- 2.8     **End Repeat**
- 2.9 Set the number format of any number shown to a whole number (0)
- 2.10 Put a message showing name and percentage of the student who obtained the lowest percentage using the variable position into line 8 of field “output2”

#### Find Min Algorithm

You must memorise the **structure** of this **algorithm** as you might be asked it in the exam.

### Testing

Test that your program correctly produces the student with the **lowest overall percentage** in **line 8** of the **output2** field. Show the **teacher** your **working** program once **completed**.

You may wish to use the **same test** data as shown below:

### Higher Computing Marks

#### Lowest Student Percentage

Student Name	Systems Mark	Software Mark	Multimedia Mark	Percentage	Grade
Steven Whyte	12	18	20	56%	C
Allan Drain	24	25	20	77%	A
James McKay	28	27	29	93%	A
Kym Munro	10	8	8	29%	F
John King	15	16	14	50%	C

The number of students who have obtained a Grade A is: 2  
 The number of students who have obtained a Grade B is: 0  
 The number of students who have obtained a Grade C is: 2  
 The number of students who have obtained a Grade D is: 0  
 The number of students who have obtained a Grade F is: 1

The student with the highest percentage is James McKay with a percentage of 93%.  
 The student with the lowest percentage is Kym Munro with a percentage of 29%.

Get Student Details

Count Student Grades

Highest Percentage Mark

Clear

Display all Students

Find a Student

Lowest Percentage Mark

Gracemount High School – Higher Computing

Task 9: Higher Computing Marks



## Task 10: ExtremeTech Graphics Card Database

### Specification

A program is required by a company called ExtremeTech. The company specialise in the selling of high quality graphics cards.

ExtremeTech require the program in their retail outlets to allow:

- The customer to **display** a list of all **graphics cards** on the system.
- The customer to **search** for all graphics cards based on their **requirements** of how much the customer is willing to spend on a graphics card (**maximum cost**), and how much RAM it must have (**minimum RAM**).
- The program should **find** and display the **name** and **clock speed** of the graphics card with the **highest** clock speed.
- The program should also allow the user to **find** the **number** of graphics cards that are **higher** than the **threshold clock speed** that the user enters.

### ExtremeTech Graphics Card Database

Displaying All Graphics Cards

Name	RAM (GB)	Clock Speed (GHz)	Cost
RadeonX2	1	1986	£187
GeForce95	1	550	£41
VaporX	2	870	£150
AsusOX2	2	790	£354
Nvidia42X	3	1600	£575

Quit Application

This field is called **output**

Display All Cards   Cards Faster Than..   Highest Clock Speed   Search on RAM & Cost

Gracemount High School – Higher Computing  
Task 10: ExtremeTech Graphics Card Database



## Task 10: ExtremeTech Graphics Card Database

### Design for “Display All Cards” Graphic



#### Stepwise Design *(the main steps of the program with data flow)*

1. Setup In/Out: arrayname, arrayram, arrayclockspeed, arraycost  
In/Out: username
2. Display Data In: arrayname, arrayram, arrayclockspeed, arraycost

#### Stepwise Refinement *(the main steps further refined into smaller steps)*

1. Setup
  - 1.1 Setup arrayname, arrayram, arrayclockspeed, arraycost as global arrays
  - 1.2 Setup username as global variable
  - 1.4 Clear the “subheading” and “output” fields
  - 1.5 Ask the user for their name
  - 1.6 Put it into the variable username
  - 1.7 Put “RadeonX2”, “GeForce95”, “VaporX”, “AsusOX2”, “Nvidia42X” into array\_name
  - 1.8 Split arrayname using a comma
  - 1.9 Put 1, 1, 2, 2, 3 into arrayram
  - 1.10 Split the arrayram using a comma
  - 1.11 Put 1986, 550, 870, 790, 1600 into arrayclockspeed
  - 1.12 Split arrayclockspeed using a comma
  - 1.13 Put 187, 41, 150, 354, 575 into arraycost
  - 1.14 Split arraycost using a comma
2. Display Data
  - 2.1 Put “Displaying All Graphics Cards” into the field “subheading”
  - 2.2 Put “Name” tab “RAM (GB)” tab “Clock Speed (GHz)” tab “Cost” into line 1 of field “output”
  - 2.3 Repeat with loop 1 to 5
  - 2.4 Put arrayname[loop], tab arrayram[loop], tab arrayclockspeed [loop], tab arraycost [loop] into line loop + 1 of field “output”
  - 2.5 End repeat

Please **READ** the following before you begin the first script.

After carefully reading through the design above. You should begin to code the first button called “Get Student Details”. Key in all of the code over the page ca

After completing **each** event, you should **test** that your program is **working** by displaying a list of all graphics cards in the output field. The output should be the **same** as shown on the right.

Open the “**ExtremeTech Graphics Card Database**” stack. It can be found in:

[LiveCode Programming Tasks > 10...ExtremeTech Graphics Card Database.livecode](#)



## Task 10: ExtremeTech Graphics Card Database

### Implementation: Script “Display All Cards”



Key the following code into the **Display All Cards** button. You **don't** need to include the **internal commentary**, it is only there to help you understand what is going on.

```
// Setup the global arrays and variable to be used in this event
global arrayname, arrayram, arrayclockspeed, arraycost, username

on mouseup
    set_up arrayname, arrayram, arrayclockspeed, arraycost, username
    display_data arrayname, arrayram, arrayclockspeed, arraycost
end mouseup

on set_up @arrayname, @arrayram, @arrayclockspeed, @arraycost, @username
    put empty into field "subheading"
    put empty into field "output"
    ask "Please enter your name"
    put it into username

    // Add the graphics card data to the arrays
    put "RadeonX2","GeForce95","VaporX","AsusOX2","Nvidia42X" into arrayname
    split arrayname by comma
    put 1,1,2,2,3 into arrayram
    split arrayram by comma
    put 1986,550,870,790,1600 into arrayclockspeed
    split arrayclockspeed by comma
    put 187,41,150,354,575 into arraycost
    split arraycost by comma
end set_up

on display_data arrayname, arrayram, arrayclockspeed, arraycost
    put "Displaying All Graphics Cards" into field "subheading"
    put "Name" & tab & "RAM (GB)" & tab & "Clock Speed (GHz)" & tab & "Cost" into line 1 of field "output" // On the same line
    repeat with loop = 1 to 5
        put arrayname[loop] & tab & arrayram[loop] & tab & arrayclockspeed[loop] & tab & "£" & arraycost[loop] into line loop+1 of field "output" // On the same line
    end repeat
    // Enable the following buttons when "Display All Cards" is selected
    enable image buttonFasterThan
    enable image buttonHighestClockSpeed
    enable image buttonRAMandCost
    enable image buttonQuitApplication
end display_data
```

### Testing

Test that your program correctly produces a list of the five graphics cards when you run your program and select the “Display All Cards” button.

Your output should look the same as that shown on the right.

If it works correctly, move onto the next part of the program.

If your program is not working correctly, **correct** your **errors** and **retest**.

Name	RAM (GB)	Clock Speed (GHz)	Cost
RadeonX2	1	1986	£187
GeForce95	1	550	£41
VaporX	2	870	£150
AsusOX2	2	790	£354
Nvidia42X	3	1600	£575

## Task 10: ExtremeTech Graphics Card Database

### Design for “Cards Faster Than..” Graphic



#### Stepwise Design *(the main steps of the program with data flow)*

1. Setup
2. Cards Faster Than    In: arrayclockspeed

#### Stepwise Refinement *(the main steps further refined into smaller steps)*

1. **Setup**
  - 1.1 Pass in arrayclockspeed as the global array to be used in this event
  - 1.3 Clear the “subheading” and “output” fields
  - 1.6 Put the heading “Find Graphics Cards Faster Than..” into field “subheading”
2. **Cards Faster Than**
  - 2.1 Setup the local variables of min\_clock\_speed and counter to be used in this subroutine
  - 2.2 Put 0 into min\_clock\_speed
  - 2.3 Put 0 into counter
  - 2.4 Ask the user to enter the minimum clock speed
  - 2.5 Put the minimum clock speed into the variable minclockspeed
  - 2.6 **Repeat with loop 1 to 5**
  - 2.7     **If** arrayclockspeed [loop] is greater than minclockspeed **then**
  - 2.8       Add 1 to the variable counter
  - 2.9     **End If**
  - 2.10 **End Repeat**
  - 2.11 Put the message “The number of graphics cards faster than ” followed by the variable minclockspeed “MHz is ” followed by the variable counter into line 1 of the field “output”

Please **READ** the following before you begin the second script.

After carefully reading through the design above. You should begin to code the first button called “Cards Faster Than..”. Key in all of the code over the page c

After completing **each** event, you should **test** that your program is **working correct**



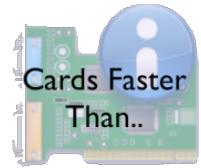
The program should take in a **minimum clock speed** from the user and using the **counting occurrences** algorithm, display the **number** of graphics cards that are faster than the minimum clock speed.

This should be placed into line 1 of the output field.

## Task 10: ExtremeTech Graphics Card Database

### Implementation: Script “Cards Faster Than..”

Key the following code into the **Cards Faster Than..** button. You **don't** need to include the **internal commentary**, it is only there to help you understand what is going on.



```
// Pass in the global arrays setup earlier
global arrayclockspeed

on mouseUp
    set_up
    cards_faster_than arrayclockspeed
end mouseUp

on set_up
    // Clear text from the fields
    put empty into field "subheading"
    put empty into field "output"

    // Display the heading
    put "Find Graphics Cards faster than.." into field "subheading"
end set_up

on cards_faster_than arrayclockspeed
    // Set up the local variables
    local minclockspeed, counter

    put 0 into minclockspeed
    put 0 into counter

    // Ask for the minimum clock speed
    ask "What is the minimum speed?"
    put it into minclockspeed

    // Display graphics cards matching search criteria
    repeat with loop = 1 to 5
        if arrayclockspeed[Loop] > minclockspeed then
            add 1 to counter
        end if
    end repeat
    put "The number of cards faster than "& minclockspeed & " MHz was "&counter into line 1 of field "output" // On the same line
end cards_faster_than
```

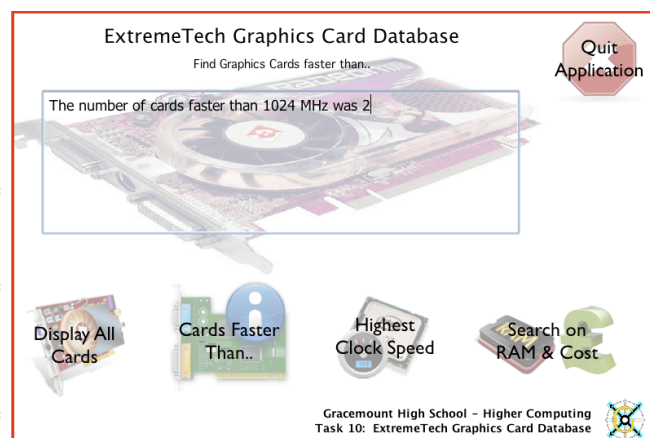
### Testing

Test that your program correctly produces displays the number of graphics cards faster than the minimum clock speed entered by the user.

The output on the right shows the number of graphics cards faster than **1024MHz**. **2** is the correct answer as both the **RadeonX2** and the **Nvidia42X** have a **faster clock speed** of **1024MHz**.

You should do **similar testing** and **check** with the **list of cards** if the **number** produced is **correct**. If it is, move onto the next part of this program.

If your program is not working correctly, **correct** your **errors** and **retest**.



## Task 10: ExtremeTech Graphics Card Database

### Design for “Highest Clock Speed” Graphic



#### Stepwise Design *(the main steps of the program with data flow)*

1. Setup
2. Highest Clock Speed      In: arrayname, arrayclockspeed

#### Stepwise Refinement *(the main steps further refined into smaller steps)*

1. **Setup**
  - 1.1 Pass in arrayname, arrayclockspeed as the global arrays to be used in this event
  - 1.2 Clear the “subheading” and “output” fields
  - 1.3 Put the heading “Find the Graphics Card with the Highest Clock Speed” into field “subheading”
2. **Highest Clock Speed**
  - 2.1 Setup the local variables of maxclockspeed and position to be used in this subroutine
  - 2.2 Put 0 into maxclockspeed
  - 2.3 Put 0 into position
  - 2.4 **Repeat with loop 1 to 5**
  - 2.5     **If** arrayclockspeed [loop] is greater than maxclockspeed **then**
  - 2.6         Put arrayclockspeed[loop] into maxclockspeed
  - 2.7         Put loop into position
  - 2.7     **End If**
  - 2.8     **End Repeat**
  - 2.9 Put the message “The card with the highest clock speed is ” followed by arrayname[position] into line 1 of field “output”

Please **READ** the following before you begin the second script.

After carefully reading through the design above. You should begin to code the first button called “Highest Clock Speed”. Key in all of the code over the page



After completing **each** event, you should **test** that your program is **working correctly**.

The program should find the graphics card with the **highest clock speed** using the **find maximum** algorithm and then display the **name** of graphics card in line 1 of the output field.

## Task 10: ExtremeTech Graphics Card Database

### Implementation: Script “Highest Clock Speed”

Key the following code into the **Highest Clock Speed** button. You **don't** need to include the **internal commentary**, it is only there to help you understand what is going on.



```
// Allow access to global arrays setup earlier
global arrayname, arrayclockspeed

on mouseUp
  set_up
  highest_clock_speed arrayname, arrayclockspeed
end mouseUp

on set_up
  // Clear text from the fields
  put empty into field "subheading"
  put empty into field "output"

  // Display the heading
  put "Find the Graphics Card with the Highest Clock Speed" into field "subheading"
end set_up

on highest_clock_speed arrayname, arrayclockspeed
  // Set up the local variables
  local maxclockspeed, position

  put 0 into maxclockspeed
  put 0 into position

  // Display graphics cards matching search criteria
  repeat with loop = 1 to 5
    if arrayclockspeed[Loop] > maxclockspeed then
      put arrayclockspeed[Loop] into maxclockspeed
      put loop into position
    end if
  end repeat
  put "The card with the highest clock speed is "& arrayname[position] into line 1 of field "output" // On the same line
end highest_clock_speed
```

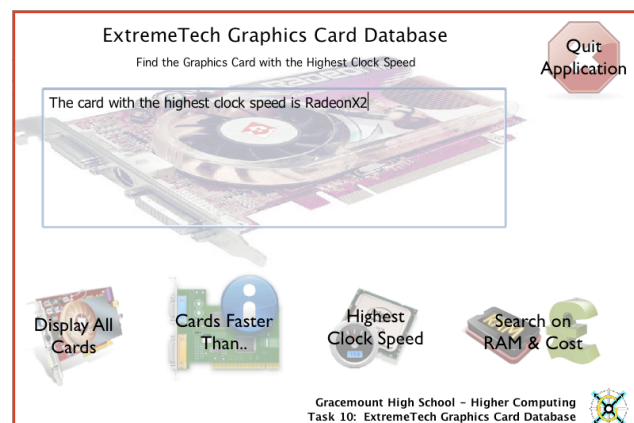
### Testing

Test that your program correctly displays the **name** of the **graphics card** with the **fastest clock speed**.

Your output should be the **same** as shown on the right. This shows that the **RadeonX2** is the graphics card with the **fastest clock speed**.

If the correct output is produced, move onto the next part of this program.

If your program is not working correctly, **correct** your **errors** and **retest**.



## Task 10: ExtremeTech Graphics Card Database

### Design for “Search on RAM and Cost” Graphic



#### Stepwise Design *(the main steps of the program with data flow)*

1. Setup
2. Search Cards In: arrayname, arrayram, arrayclockspeed, arraycost

#### Stepwise Refinement *(the main steps further refined into smaller steps)*

1. **Setup**
  - 1.1 Pass in arrayname, arrayram, arrayclockspeed and arraycost as the global arrays to be used in this event
  - 1.2 Clear the “subheading” and “output” fields
  - 1.3 Put the heading “Find the Graphics Card that match RAM and Cost” into field “subheading”
2. **Search Cards**
  - 2.1 Setup the local variables of minram and maxcost to be used in this subroutine
  - 2.2 Ask the user to enter the minimum amount of RAM required
  - 2.3 Put it into the variable minram
  - 2.4 Ask the user to enter the maximum amount that they are willing to spend on a graphics card
  - 2.5 Put it into the variable maxcost
  - 2.6 Put “Name” **tab** “RAM (GB)” **tab** “Clock Speed (GHz)” **tab** “Cost” into line 1 of field “output”
  - 2.7 **Repeat with loop 1 to 5**
  - 2.8     **If** arrayram[loop] >= minram and arraycost[loop] is <= maxcost **then**
  - 2.9         Put arrayname[loop], **tab** arrayram[loop], **tab** arrayclockspeed [loop], **tab** arraycost [loop] into line loop + 1 of field “output”
  - 2.10    **End If**
  - 2.11 **End Repeat**

Please **READ** the following before you begin the second script.

After carefully reading through the design above. You should begin to code the first button called “Search on RAM and Cost”. Key in all of the code over the p

After completing **each** event, you should **test** that your program is **working correctly**



The program should find the graphics cards based on the minimum RAM and maximum cost that the user enters using the **linear search** algorithm. It should display a list of graphics cards which match the search in the output field.



## Task 10: ExtremeTech Graphics Card Database

### Implementation: Script “Search on RAM and Cost”

Key the following code into the **Highest Clock Speed** button. You **don't** need to include the **internal commentary**, it is only there to help you understand what is going on.



```
// Allow access to global arrays setup earlier
global arrayname, arrayram, arrayclockspeed, arraycost

on mouseUp
  set_up
  search_cards arrayname, arrayram, arrayclockspeed, arraycost
end mouseUp

on set_up
  // Clear text from the fields
  put empty into field "subheading"
  put empty into field "output"
  // Display the heading
  put "Find Graphics Cards that match RAM and Cost" into field "subheading"
end set_up

on search_cards arrayname, arrayram, arrayclockspeed, arraycost
  // Set up the local variables
  local minram
  local maxcost
  local found
  // Ask the user for the minimum cost and maximum amount of RAM required
  ask "Please enter the minimum amount of RAM you wish your graphics card to have:"
  put it into minram
  ask "Please enter the maximum amount you are willing to spend on a new graphics card:"
  put it into maxcost

  // Display graphics cards matching search criteria
  put "Name" & tab & "RAM (GB)" & tab & "Clock Speed (GHz)" & tab & "Cost" into line 1 of field "output"
  put false into found
  repeat with loop = 1 to 5
    if arrayram[loop] >= minram AND arraycost[loop] <= maxcost then
      put arrayname[loop] & tab & arrayram[loop] & tab & arrayclockspeed[loop] & tab & "£" & arraycost[loop] into line loop+3 of field "output" // On the same line
      put true into found
    end if
  end repeat
  if found = false then put "***** No Cards which match your search have been found *****" into line position of field "output" // On the same line
end search_cards
```

### Testing

Test that your program correctly displays a **list** of graphics cards **Cost**.

The output shown on the right assumes a **minimum RAM of 3GB**

If the correct output is produced, move onto the next part of this project

If your program is not working correctly, **correct** your **errors** and retest

