7. Look back on Project 6.

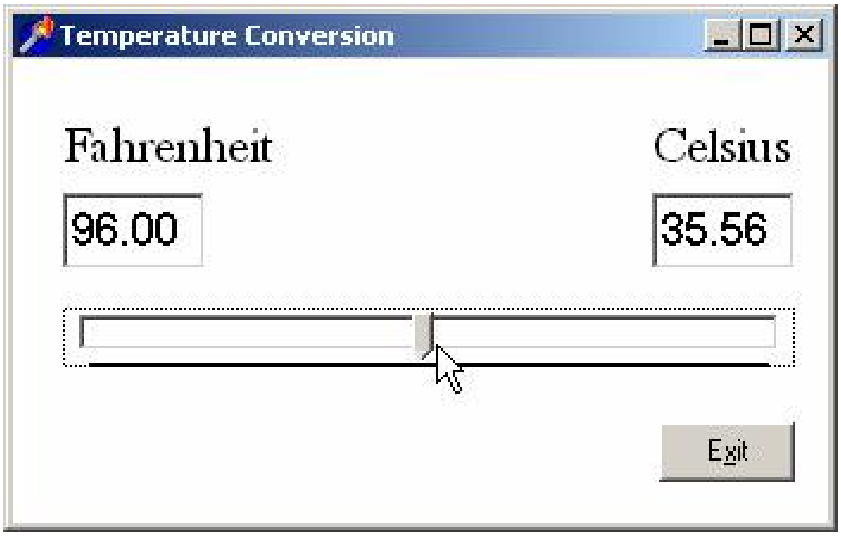
   a What happens if you type in a letter, or a negative number into the edit box?

   b Is the program user proof?

   c What could we do to make it user proof?

Project 7 – Temperature conversion

To investigate the use of sequence and variables we will create a program that will convert degrees between Fahrenheit and Celsius using a *trackbar.*



Fahrenheit 96.00

Celsius 35.56

Task: Convert degrees *Fahrenheit* to degrees *Celsius*.

Objects: Two edit boxes to display degrees, trackbar, labels for display, and an exit button.

Events: Change on trackbar, mouse click to exit.

1. a Start a new project and set up labels for *Fahrenheit* and *Celsius* with edit boxes under them to hold the values.

   b Name the form *ConvForm* and set its caption.

   c Name the edit boxes *FText* and *CText* and set the text for each at *32* and *0* (because 32° F = 0° C).

   d Arrange alignment, sizes, fonts and colours to suit yourself.

2. Add a button for *Exit* with the appropriate code.

3. The scroll-like bar at the bottom is called a *track bar* and is found on the *Win32* tab of the component palette.

   Stretch it across the form with the following properties:

Property:	Name	Orientation	Min	Max	Position	TickMarks
Value:	TempTrack	trHorizontal	-100	300	32	tmBottomRight

These will enable the track bar to read values from –100°F to + 300°F, with the starting position being 32°F. (You might like to experiment with variations on the TickMarks property.)

4. Save the project as *convert.pas* and *project7.dpr* in your Project 7 folder.

We must now read the value from the trackbar, display it in the Fahrenheit edit box, and convert it to degrees Celsius for the other box. In sequence the algorithm steps are:

```
read the temperature from the trackbar
display the temperature in the Fahrenheit box
convert the temperature to Celsius
display the temperature in the Celsius box
```

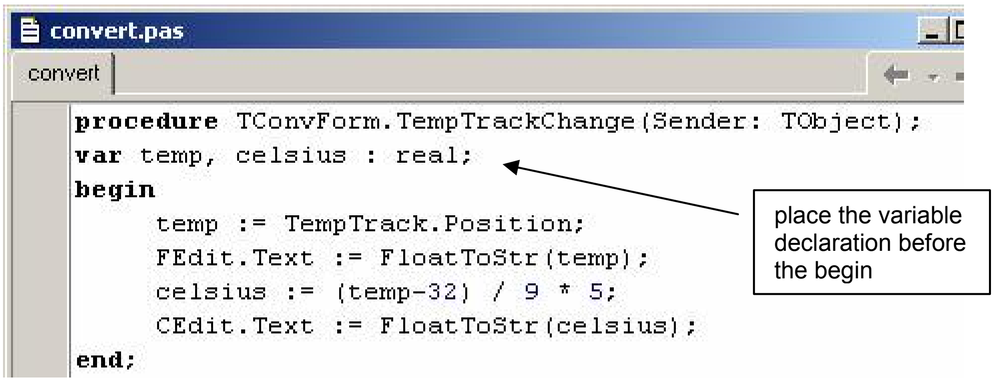
To convert degrees Fahrenheit to degrees Celsius we use the formula C = (F - 32) / 9 * 5

e.g. 180°F is (180 - 32) / 9 * 5 which equals 82.2°C

The algorithm written in pseudocode then is:

```
read TEMP
write TEMP
CELSIUS = (TEMP - 32) / 9 * 5
write CELSIUS
```

5. We can now add this to our project. Double click on the trackbar and make the following changes to the procedure:



```
procedure TConvForm.TempTrackChange(Sender: TObject);
var temp, celsius : real;
begin
     temp := TempTrack.Position;
     FEdit.Text := FloatToStr(temp);
     celsius := (temp-32) / 9 * 5;
     CEdit.Text := FloatToStr(celsius);
end;
```

place the variable declaration before the begin

Here we have declared both *temp* and *celsius* as real variables. *Temp* could have been an integer if we wished, but *celsius* must be real. Why?

6. Re-save and run the project.

By dragging the pointer on the track bar the values in the edit boxes will show between –100°F and +300°F, converting to between –73.3°C and +148.8°C.

7. To improve the appearance of the values displayed we can format the values in the edit boxes to look the same.

```
FEdit.Text := FloatToStrF(temp, ffFixed, 5, 2);
```

and

```
CEdit.Text := FloatToStrF(celsius, ffFixed, 5, 2);
```

You may also want to alter the original settings of the edit boxes to *32.00* and *0.00* to be consistent.

8. Make final adjustments to the form to suit yourself (e.g. alter the *max* and *min* values on the track bar). Save and exit.

For our project the code for the conversion was planned as a *sequence* of steps. Sequence is the simplest of programming constructs. In the next sections we will see how to tackle the more powerful constructs of selection and iteration.

Activity 3.2 – Business as usual

For this activity you can either develop a Delphi application to solve the problem or alternatively just write the necessary Pascal procedure on paper.

1. Denise's Discount Dress Shop has a policy of discounting all items sold. Some dresses are discounted by 10%, some by 15% etc. Denise would like a program where she and her assistants can enter the price of the dress and the level of discount to find out the selling price.

   To solve this problem there are two steps that have to be carried out, the calculation of the amount of discount and then the actual selling price. We could do this as one step but we will break it into two.

   Firstly calculate the discount. If discount is 10% then the amount of discount will be 10% of the marked price e.g. 10% of $34.90. Writing this as pseudocode is:

   ```
   DISCOUNT = RATE * COST                (e.g. discount = 10% x $34.90 = $3.49)
   ```

   Secondly selling price is the marked price minus the discount or:

   ```
   SELL_PRICE = COST - DISCOUNT          (e.g. selling price = $34.90 – $3.49 = $31.41)
   ```

   In pseudocode the algorithm is then:

   ```
   read COST
   read RATE
   DISCOUNT = RATE * COST
   SELL_PRICE = COST - DISCOUNT
   write SELL_PRICE
   ```

   Prepare an application for Denise whereby she can enter the cost and the discount rate to have the selling price displayed.

   (Hint: be careful with *rate*; it will need to be entered as a decimal e.g. 0.1 for 10%, or if entered as a whole number then divided by 100.)

2. Mike's Mini-Skips is a rubbish removal company. Mike charges $25 for the skip for the first day, plus $15 each extra day. He then charges 25c per kilometre to take the rubbish to the dump. Write a program to calculate his charges.

   Hint: CHARGE = 25 + (15 * DAYS) + (KM * 0.25)

3. Mary operates an import business. She always adds 25% onto the price of goods as her commission and to cover costs. Prepare a program that allows Mary to enter the name of an imported item, its landed cost, the number of items, and then displays this information and outputs her total profit.

4. Cyril's Cycles hires out push bikes at $12.60 per hour. Write a program that allows Cyril to enter the time-out and time-in of a bike, and calculates the cost of hire. (To simplify this program you may use 24 hour time, e.g. 2 p.m. is 1400 hours. If you do, be careful: 0945 to 1415 is six and a half hours, not 1430 minus 0945!)