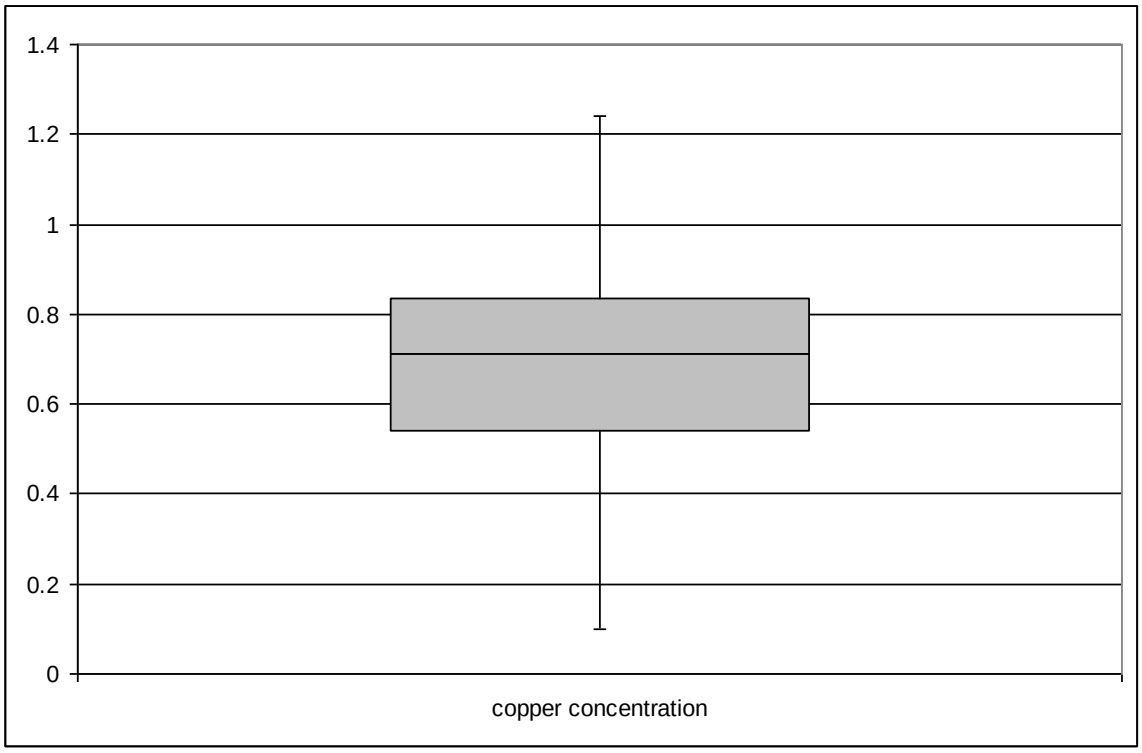
How to make a box-whiskers plot with Excel

Box and Whisker Charts (Box Plots) are commonly used in the display of statistical analyses. Microsoft Excel does not have a built in Box and Whisker chart type, but you can create your own custom Box and Whisker charts, using stacked bar or column charts and error bars. This tutorial shows how to make box plots in all modern versions of Excel.

Urinary concentrations of copper in n = 40 children



In its simplest form, the box and whisker diagram has a box showing the range from first to third quartiles, and the median divides this large box, the "interquartile range", into two boxes, for the second and third quartiles. The whiskers span the first quartile, from the second quartile box down to the minimum, and the fourth quartile, from the third quartile box up to the maximum.

Sample data and calculations

Let's use the simple data set data1.txt for our tutorial, the data set that has been analyzed in DataAnalysisSession1.xls. The set of values was taken from a normally distributed population. The set is composed of 20 values.

First, compute some simple statistics, such as the median, min, max, first and third quartiles. The formulas used in column H are shown in column I of the screen shot.

	G	H	I
1			**FORMULAS**
2	**n**	40	"=COUNT(A2:A41)"
3	**median**	0.71	"=MEDIAN(A2:A41)"
4	**min**	0.1	"=MIN(A2:A41)"
5	**max**	1.24	"=MAN(A2:A41)"
6	**range**	1.14	"=H5-H4"
7	**first quartile**	0.5425	"=QUARTILE(data1,1)"
8	**third quartile**	0.835	"=QUARTILE(data1,3)"
9			
10	**copper concentration**		
11	**Bottom**	0.5425	"=H7"
12	**2Q Box**	0.1675	"=H3-H7"
13	**3Q Box**	0.125	"=H8-H3"
14	**Whisker-**	0.4425	"=H7-H4"
15	**Whisker+**	0.405	"=H5-H8"
16	**Offset**	0.5	

Finally, let's determine which values we need to plot (rows11 to 16). Our chart has a box for the second quartile, which shows the difference between median and first quartile calculated above. It has a box for third quartile, which shows the difference between the third quartile calculation and the median. The bottom of the lower box rests on the first calculated quartile. The down whisker is as long as the first quartile minus the minimum and the up whisker is as long as the maximum minus the third quartile.
The offset is given just to provide the location of the midpoint of the boxes on the x-axis.

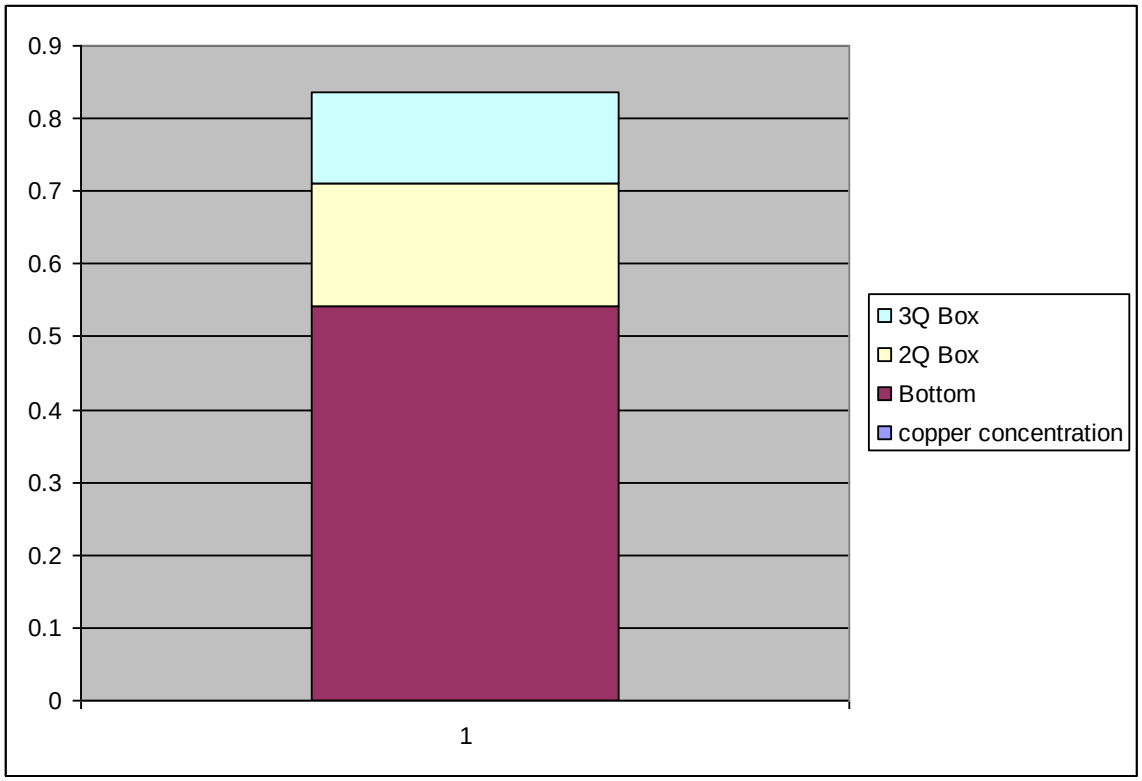
Chart construction

Select the header row of the calculated data and the three rows that include Bottom, 2Q Box, and 3Q Box. This multiple-area range is highlighted in orange below.

	G	H	I
1			**FORMULAS**
2	**n**	40	"=COUNT(A2:A41)"
3	**median**	0.71	"=MEDIAN(A2:A41)"
4	**min**	0.1	"=MIN(A2:A41)"

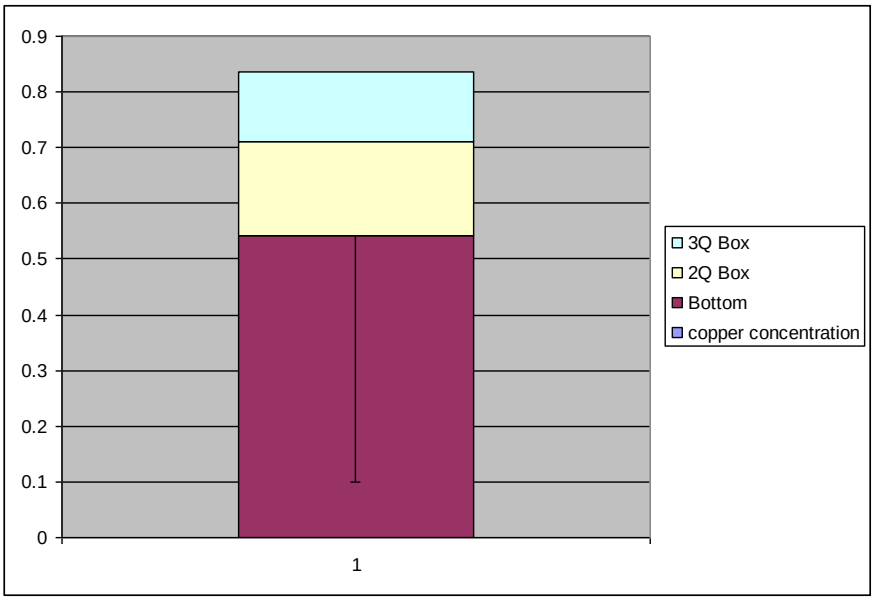
5	**max**	1.24	"=MAN(A2:A41)"
6	**range**	1.14	"=H5-H4"
7	**first quartile**	0.5425	"=QUARTILE(data1,1)"
8	**third quartile**	0.835	"=QUARTILE(data1,3)"
9			
10	**copper concentration**		
11	**Bottom**	0.5425	"=H7"
12	**2Q Box**	0.1675	"=H3-H7"
13	**3Q Box**	0.125	"=H8-H3"
14	**Whisker-**	0.43875	"=1.5*(H8-H7)"
15	**Whisker+**	0.43875	"=1.5*(H8-H7)"
16	**Offset**	0.5	

With this range selected, insert a stacked column chart or a stacked bar chart. Be sure to use the stacked version, and not the 100% stacked version, of the column or bar chart. Click “next” and on the Data range window select “rows”. You should obtain something like this:

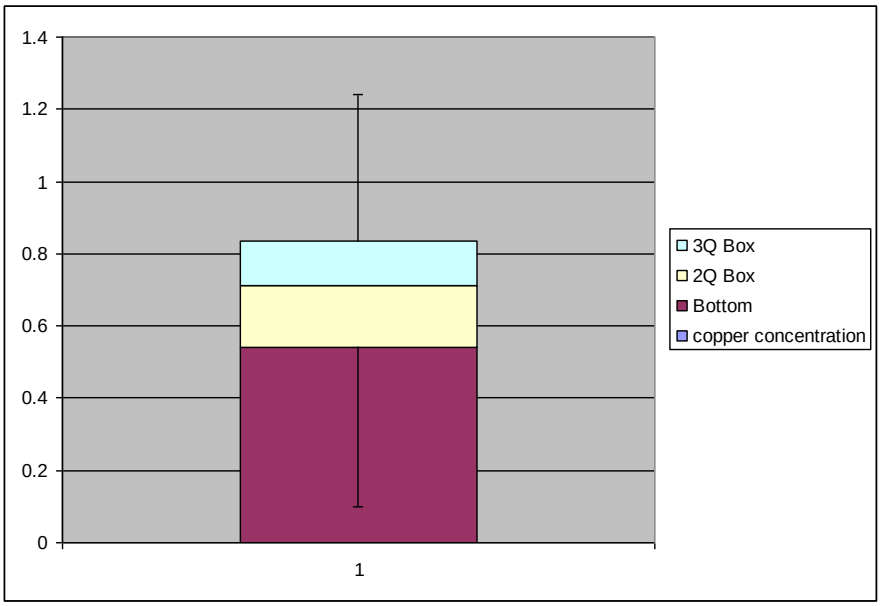


To add the down whisker, right click on the Bottom series, then in the Format Data Series -> Y Error Bars, select Custom. Go to the Negative Error Value box “-“ and select the Whisker- row from the table (H14). Click OK and Close to get back to Excel. This

“down” error bar (whisker) extend from the bottom (left) edge of the 2Q Box downward (leftward) into the Bottom series.

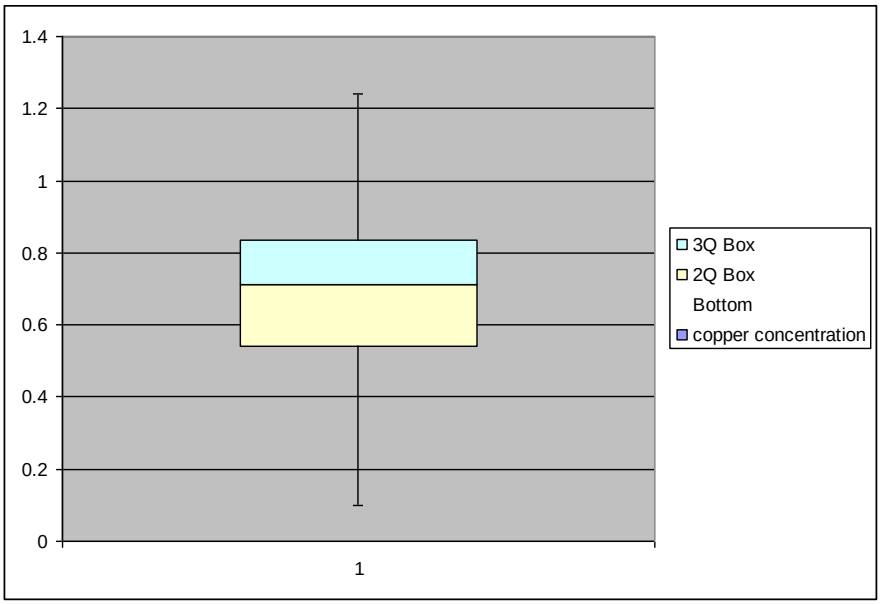


To add the up whisker, right click on the 3Q Box series, then in the Format Data Series -> Y Error Bars, select Custom. Go to the Positive Error Value box “+” and select the Whisker+ row from the table (H15).

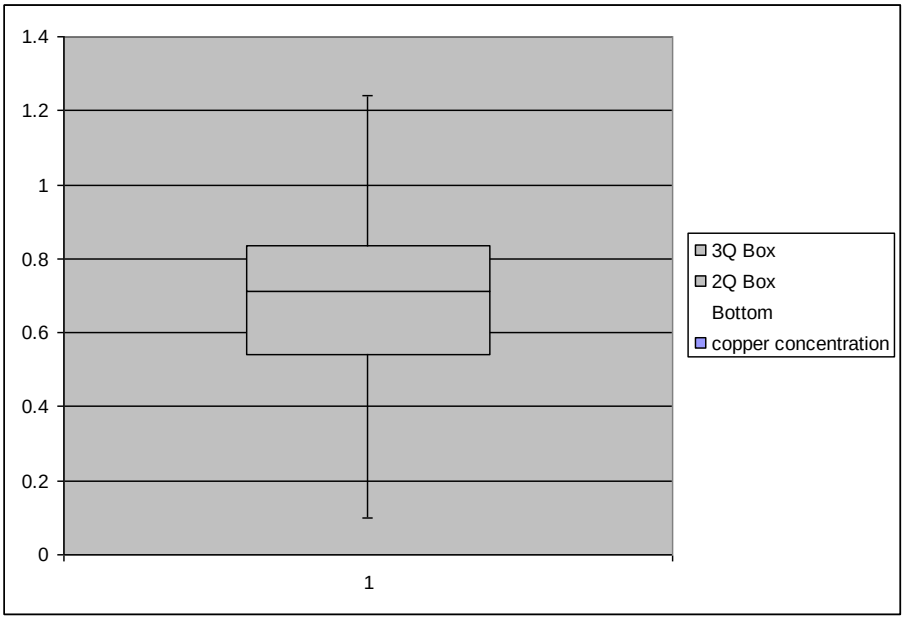


This “up” error bars (whiskers) extend upward (rightward) from the top (right) of the 3Q Box.

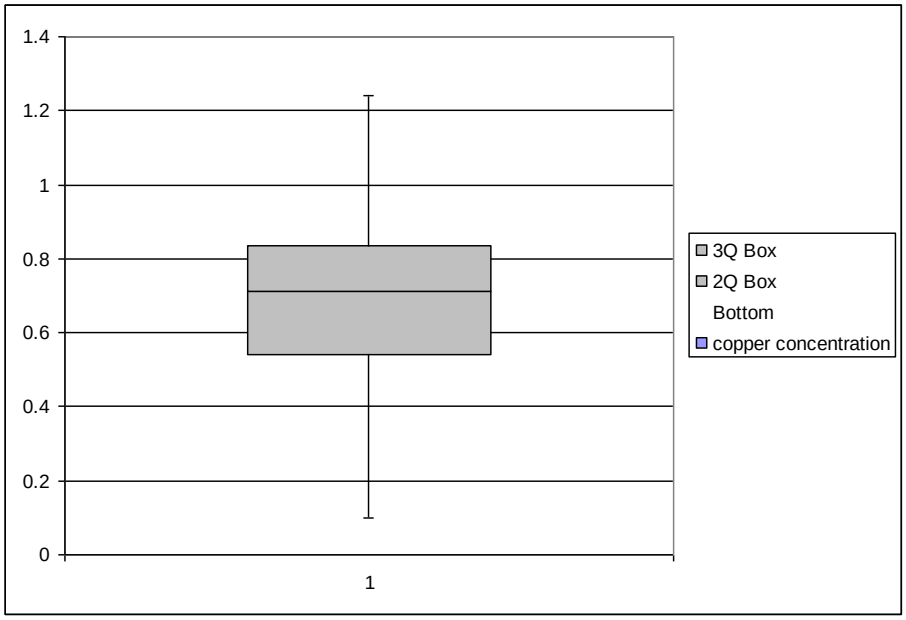
Now we can format the boxes. Select the Bottom series, then in the Format Data Series -> Patterns, apply no fill and no border, so it is hidden.



Then select each of the 2Q Box and 3Q Box series, and apply a dark border and a light fill.



Then right click on the plot area, select Format Plot Area, and apply no fill.



The box-whiskers plot is ready! Now you can make it prettier, adding proper axis labels, title, hiding the legend, etc.