

LabWare CEC 2014

Methods of Implementing Sample Barcode Labels

Zeni Mabidi & Cathy Ross

Overview

- ▶ Who are Set Point Labs – How do we use LW
- ▶ Jobs at sites and the label requirement
- ▶ 3 Techniques
 - LW Label Printer Drivers
 - Crystal Reports
 - Printer Control Languages
 - Some LIMSBasic
 - A hybrid method
- ▶ A summary of Pros and Cons
- ▶ How this new knowledge was used
- ▶ Thanks, Acknowledgments and Questions

Who are we?



Proud members of the Set Point Group

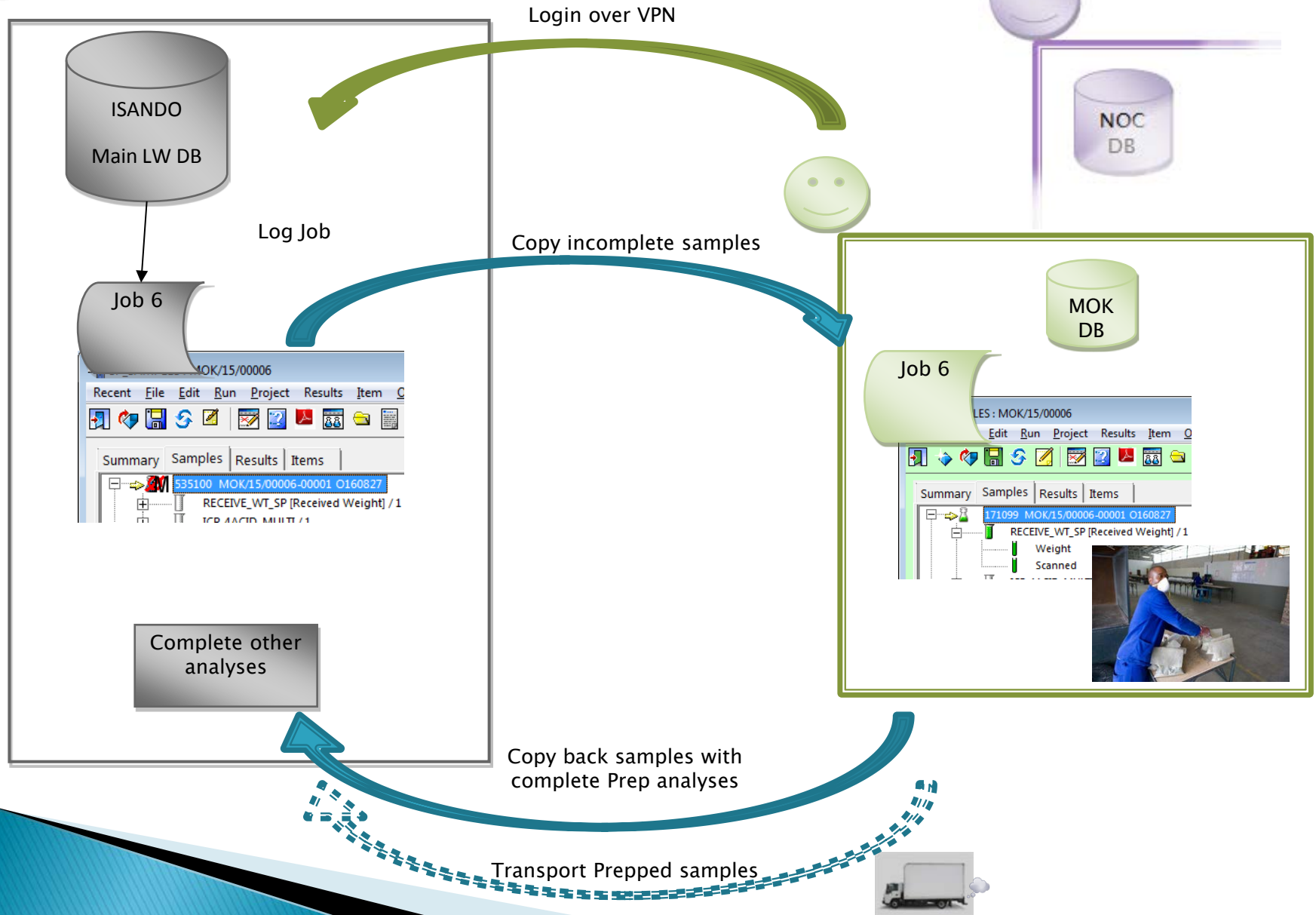
- Set Point Laboratories is a SANAS accredited analytical testing lab supporting the mining and geological industry, doing Fire Assay, ICP MS & OES, XRF & Wet chemistry.
- We also have an accredited water testing laboratory.
- The facility can handle over 25 000 samples per month. We currently have 70 daily LabWare users and 10-20 less frequent users, and 2 LIMS Developers
- We have satellite sample prep facilities in Mokopane, Kuruman, Botswana, Gabon & Mozambique
- The LabWare Project started in 2011, went live in Jan 2013, replacing a one-man bespoke Excel/VBA in-house LIMS.



Installation

Section	Function	LabWare Functionality	Improvements (wishes)
Quotations	Manage customers and quotations	Charge Manager for Quotations MSExcel populated from LW (Submission sheets)	Charge Manager limitations : Browsing and filtering quotations
Reception	Receiving and logging & paper work	Subroutine to log jobs and samples – Project Manager with Item tables Excel files for result storage until the system is complete Pastel link to manage credit limits	Document Manager Contact Manager Incident Manager
Sample Prep	Sorting, labelling, weighing, drying, crushing, splitting, milling	Labelling via subroutine Batch Manager with batch reports and batch results Folder Manager Balances with COMM direct	Storage Manager Worksheets Handheld scanning
Fire Assay	Prep for ICP analysis Lead Collection & Nickel Sulphide	Batch Manager with batch reports and batch results	Linking to furnace thermometers Reducing swapped samples
ICP	Accredited and non–accredited methods. Prep and Instrument batches	Batch Manager with batch reports and batch results Instrument Program setup MSExcel macro for manipulating exported results Balances with COMM direct Varian & Optima ICPs export results	QC data presentation Save monitored Intensities Instrument calibrations
XRF	Accredited and non–accredited methods. Prep and Instrument Batches	Batch Manager with batch reports and batch results Instrument Program setup MSExcel macro for manipulating exported results ARL XRFs & Thermo OXSAS software directly linked to LW	QC data presentation Save monitored Intensities Instrument calibrations
WetChemistry	More variable	SG Visual Workflow for importing results from instrument files. Other methods still only using Excel	QC data presentation Save monitored Intensities Instrument calibrations
Water/Coal	Accredited and non–accredited methods.	Batch Manager	QC data presentation Save monitored Intensities Instrument calibrations
Satellite Labs	Mokopane – Prep & Coal Kuruman – Prep & XRF	XML and Zip in subroutines to transfer Jobs to satellite labs	Streamline transfer
Reporting	Standard SANAS COA reports, & customized reports for DB loading	Crystal Reports LIMSBasic Excel Macros	
Invoicing	Handle differences with Quotation, interface with Pastel Evolution	Pastel link	Financial reports
Management	Management reporting, monitoring performance of Std Ref Material, instrument loads and indicator drifts, users, etc	Crystal Reports LIMSBasic Excel Macros	Change Management Package

Jobs at Sites



Sample labelling overview

- Jobs (Samples) are received at the main (central) lab and satellite labs
- 2 of the satellite labs have small LW installations, copies of the main system. They connect to Main LW on VPN, log their jobs and then transfer them to site.
- Hence, all jobs are on the central database with one sample number & job sequence for labels and for invoicing.
- Labels for jobs are printed at the site with the central sample number, so they can be scanned when arriving at the main site.
- We have not investigated LW labelling functions fully, so are taking the opportunity of this CEC to understand them, as well as assess the strengths and weaknesses of each to see how we can improve this at Setpoint.



Label printing techniques

To set up labels, the steps are

Design the label

Method of printing (How is it done, eg. subroutine)

Event for printing (When is it done, eg. Menu, Automation)
although different, the distinction can get fuzzy

There are a few techniques for printing barcode labels from LabWare:

1. LabWare Label Printer Table & Drivers
2. Crystal Reports (or other reporting program eg MSWord)
3. Printer Control Languages eg. IPL, EPL or ZPL
4. Hybrid of Label Printer Table and PCLs



The method you choose should match your resources and requirements

1. Using LW Label Printer Drivers



This is the simplest method

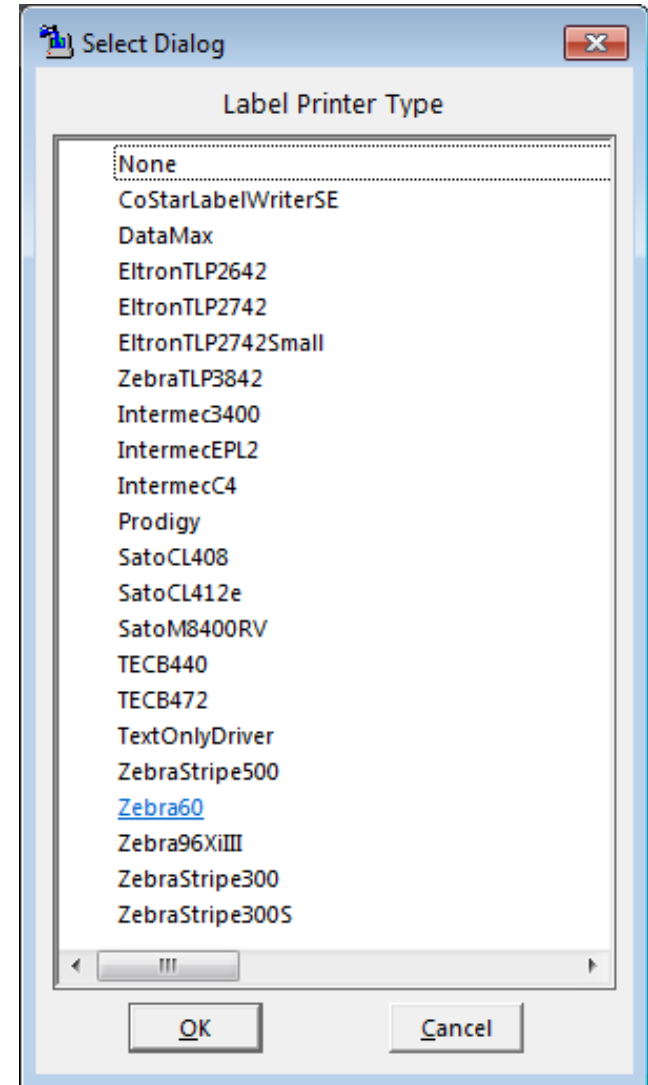
The LabWare Help is great, once you know where to start
The hardest part is realizing just how easy it is

Only printers defined in LW can be used

They are the most common, and the Zebra drivers work
for our Zebra S4M and TLP 2844

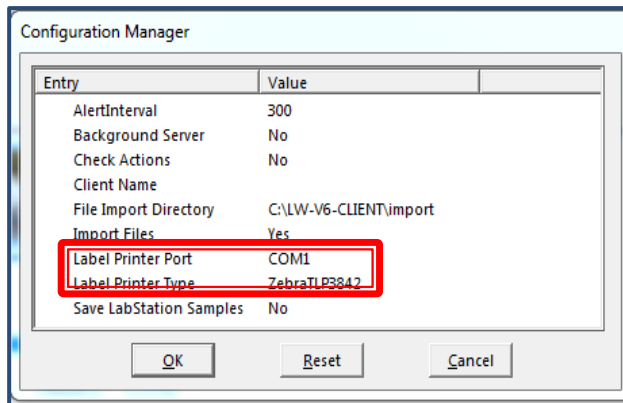
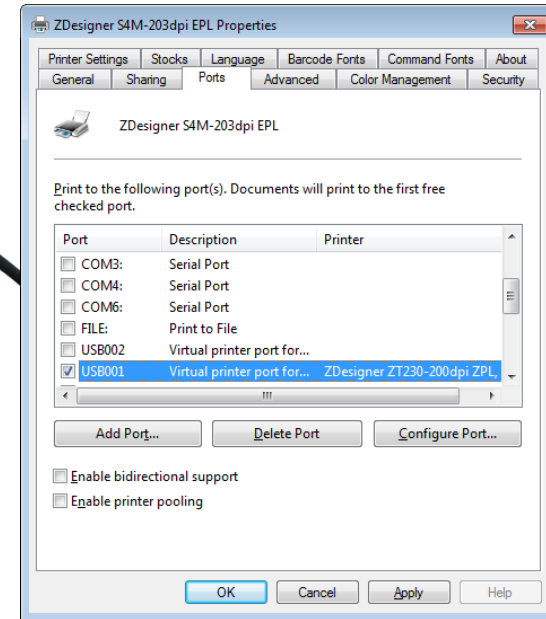
Steps

1. Connect the printer and assign the port in Windows
2. Setup Client Configuration
3. Design the label
4. Determine / implement the calling method



Setup Printer and Client Configuration

- Setup the printer on the PC
Connect to the port (COM, USB or TCP)
in Windows (Generic / Text Printer)



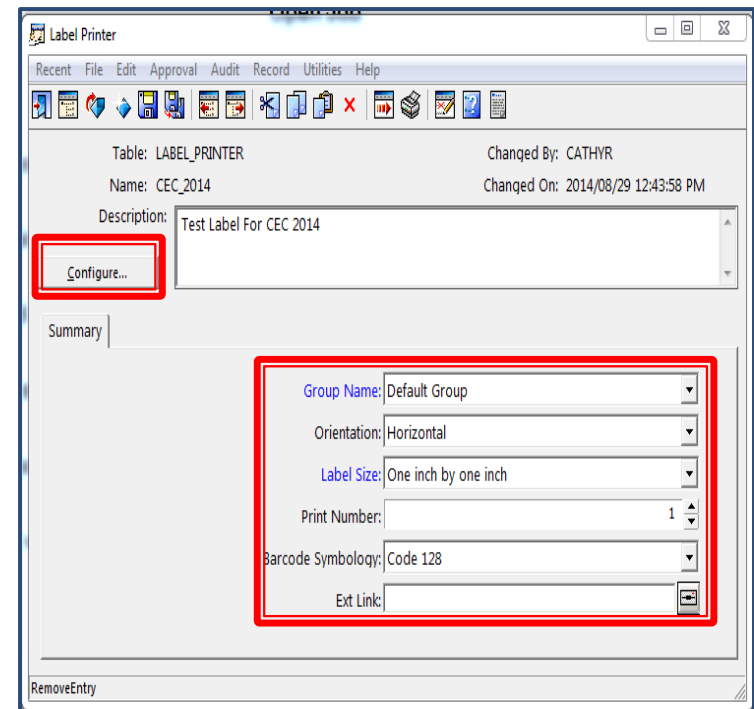
- In LabWare Client
Configure | System | Client menu
choose the Label Printer Type
choose the Label Printer Port

When the label printing is triggered eg. Test... button, the label will be sent to the printer on this port.

The client determines the label printer, not the label, only one printer per client
You can set more than one client per PC, if required

Design the Label

- ▶ The LIMS Administrator designs configures the label in the Label Printer table by using the Label Dialog
- ▶ The table name is a bit confusing, it is for the label configuration, not the label printer names
- ▶ Orientation – Horizontal or Vertical
- ▶ Choose the label size from the list
 - If it is not there, I don't think it matters, especially if all lines are left justified
- ▶ Print number for more than one of each label – only useful if all samples need the same number of labels all the times
- ▶ Symbology
 - 3of9 or 39 is the most common
- ▶ Select Configure to setup the lines of the label with free text and SAMPLE table fields



Label Printer

Recent File Edit Approval Audit Record Utilities Help

Table: LABEL_PRINTER Changed By: CATHYR
Name: CEC_2014 Changed On: 2014/08/29 12:43:58 PM
Description: Test Label For CEC 2014

Configure...

Summary

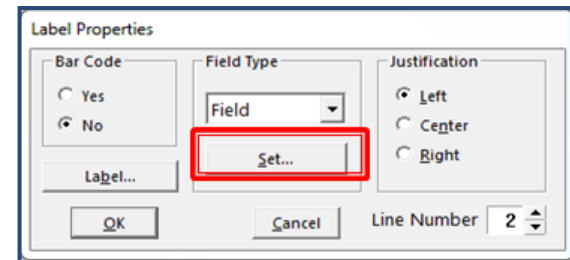
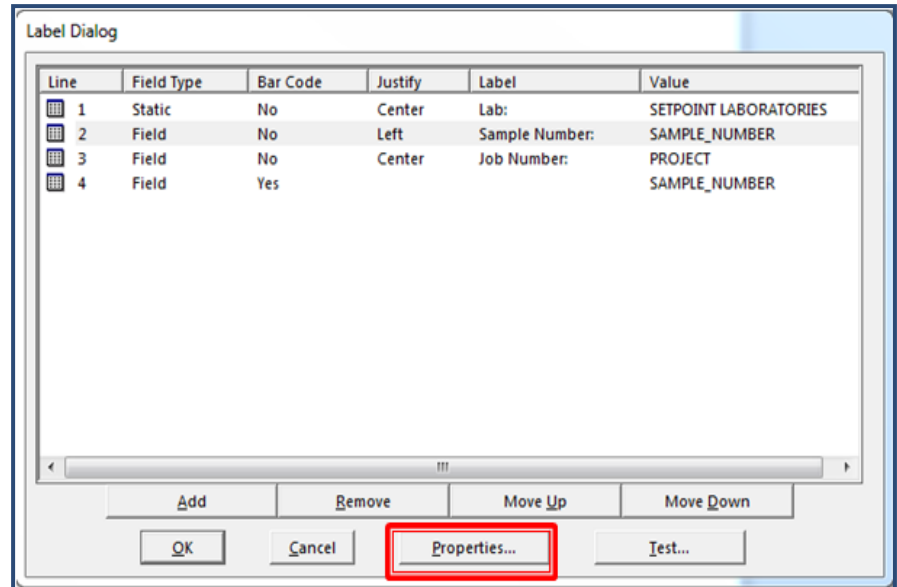
Group Name: Default Group
Orientation: Horizontal
Label Size: One inch by one inch
Print Number: 1
Barcode Symbology: Code 128
Ext Link:

RemoveEntry

Design the Label lines

Set up the fields required and specify their properties

- Add a new row for each line
- **Properties...** Setup the line
- **Field Type** – Static, Field or Formula
- **Barcode** – usually SAMPLE_NUMBER
- **Justify** – Left, Right or Centre
Barcoded lines span whole label, not justified
- **Label** – Description next to field
- **Value** – Text, field name, or formula code
- **Test...** Prompts for a Sample number and sends a label to the printer



The Test button will be greyed out if the Client has not been configured with the Printer Type & Port

Triggering the Label – automatically on Sample Login Template

How labels will be printed will depend on the needs of the laboratory. Some of the methods are: SLT, Subroutine, Event trigger

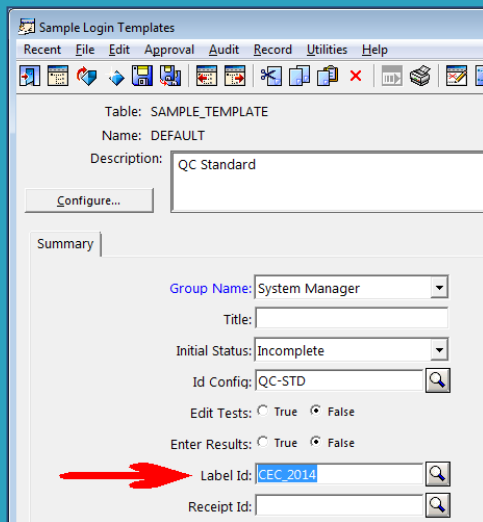


Simplest Method

If the Label ID (LABEL_PRINTER.NAME) is set, the label will automatically print when a sample is logged.

A slight variation, if a different label needed for some criteria, set it on the SLT fields using a formula

One label type per SLT



Sample Login Templates

Table: SAMPLE_TEMPLATE
Name: DEFAULT
Description: QC Standard

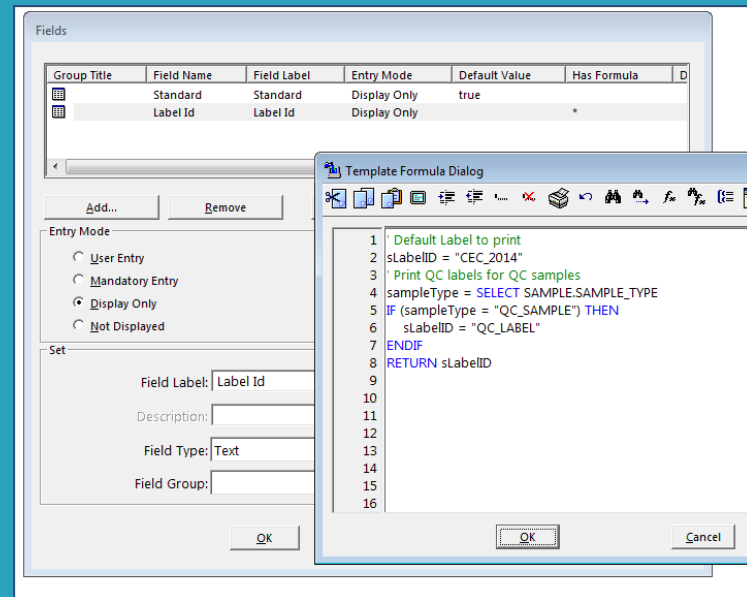
Configure...

Summary

Group Name: System Manager
Title:
Initial Status: Incomplete
Id Config: QC-STD
Edit Tests: True False
Enter Results: True False
Label Id: CEC 2014
Receipt Id:

OR

Different labels per SLT



Group Title	Field Name	Field Label	Entry Mode	Default Value	Has Formula	D
Standard	Standard	Standard	Display Only	true		
	Label Id	Label Id	Display Only		*	

Template Formula Dialog

```

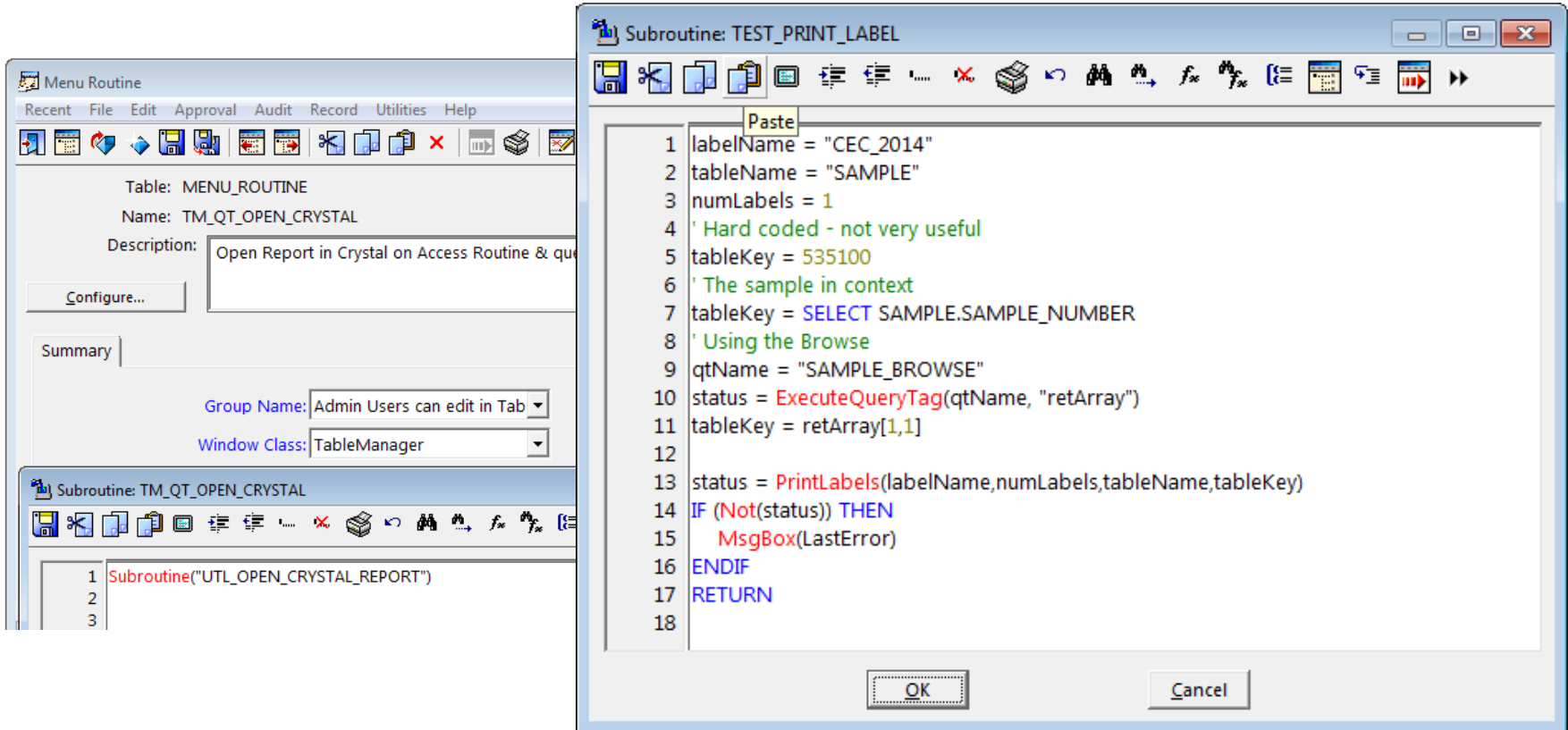
1 Default Label to print
2 sLabelID = "CEC_2014"
3 Print QC labels for QC samples
4 sampleType = SELECT SAMPLE.SAMPLE_TYPE
5 IF (sampleType = "QC_SAMPLE") THEN
6   sLabelID = "QC_LABEL"
7 ENDIF
8 RETURN sLabelID
  
```

Entry Mode: User Entry, Mandatory Entry, Display Only, Not Displayed

Set: Field Label: Label Id, Description:, Field Type: Text, Field Group:

Triggering the Label – Subroutine

- If the label needs to be printed from a menu, visual workflow, an event trigger or automation script, create a subroutine



The image shows two overlapping windows from a software application. The background window is titled 'Menu Routine' and shows configuration for a table named 'MENU_ROUTINE' with the name 'TM_QT_OPEN_CRYSTAL'. The description is 'Open Report in Crystal on Access Routine & qu'. Below this, there are fields for 'Group Name' (set to 'Admin Users can edit in Tab') and 'Window Class' (set to 'TableManager'). At the bottom, a subroutine is defined: 'Subroutine("UTL_OPEN_CRYSTAL_REPORT")'.

The foreground window is titled 'Subroutine: TEST_PRINT_LABEL' and contains the following code:

```

1  labelName = "CEC_2014"
2  tableName = "SAMPLE"
3  numLabels = 1
4  ' Hard coded - not very useful
5  tableKey = 535100
6  ' The sample in context
7  tableKey = SELECT SAMPLE.SAMPLE_NUMBER
8  ' Using the Browse
9  qtName = "SAMPLE_BROWSE"
10 status = ExecuteQueryTag(qtName, "retArray")
11 tableKey = retArray[1,1]
12
13 status = PrintLabels(labelName,numLabels,tableName,tableKey)
14 IF (Not(status)) THEN
15     MsgBox(LastError)
16 ENDIF
17 RETURN
18
  
```

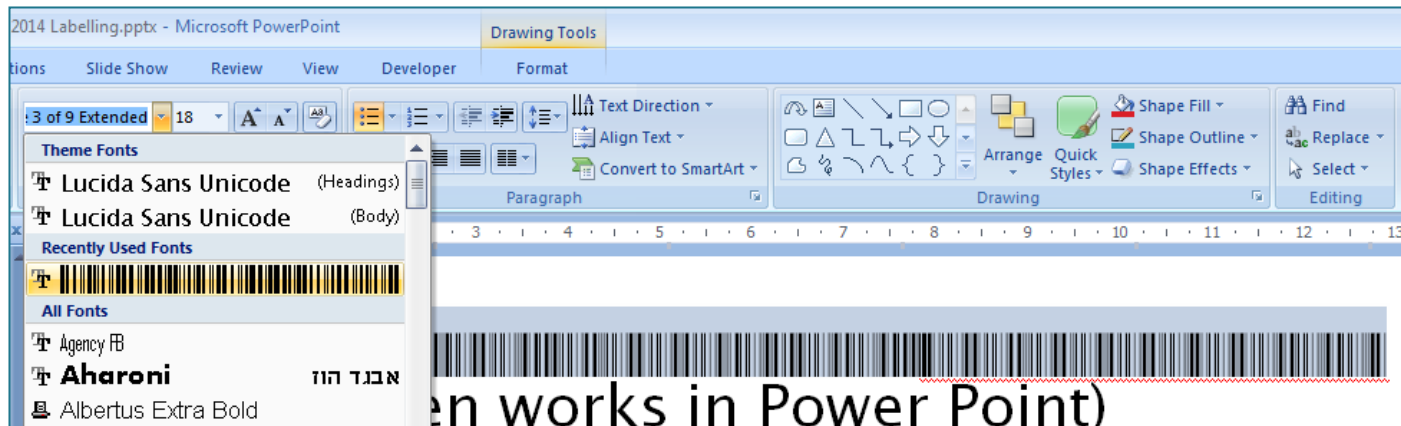
If different clients have different printer models, each will print the same label correctly

2. Using Crystal Reports

This assumes an understanding of Crystal Reports, creating the RPT files and the LW QueryTag setup.

The Quick & Nasty

- ▶ There is a free barcode font Free3of9 and Free3of9 Extended
Just add it to the Windows fonts folder on all PCs printing the report
- ▶ Use the font in the report, just like any other font
Barcoded data must have an asterisk prefix & suffix – *1234567*



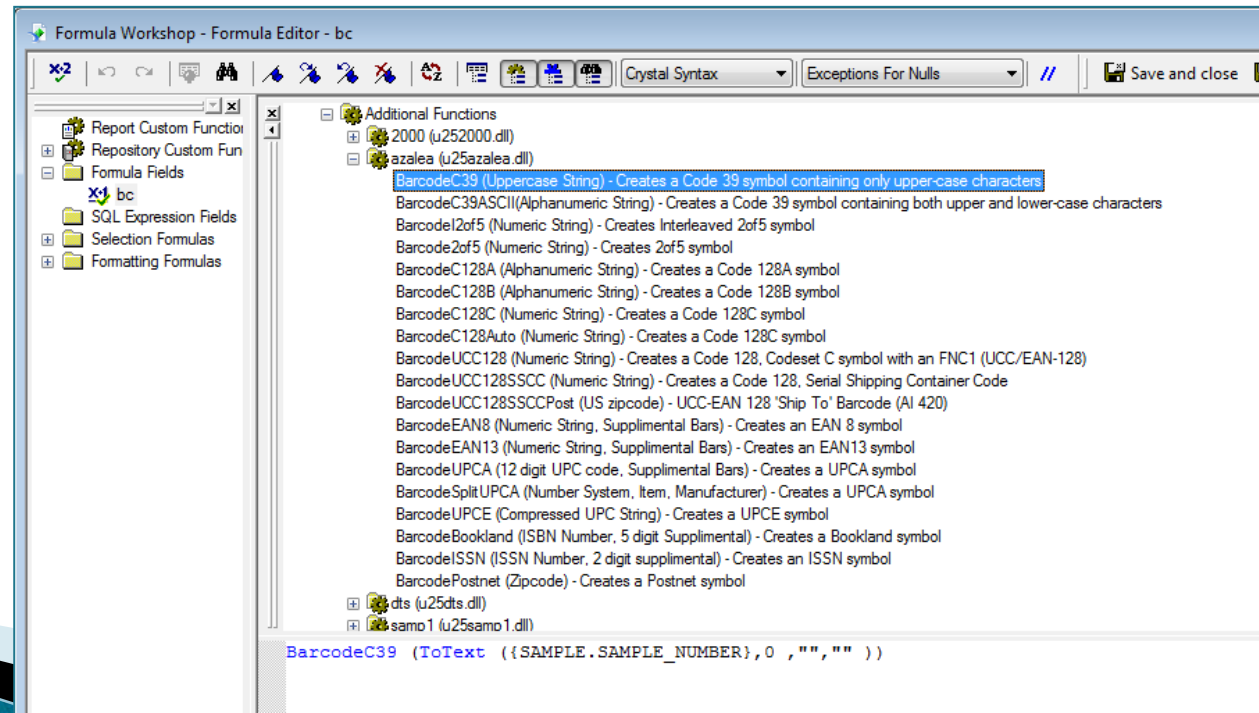
- ▶ In our limited experience, there is a fairly high error rate
Rating “Annoying”, every week or so (as judged by helpdesk)

... So a preferred method is ...

Crystal Reports with Code128

From KT00303

- ▶ The author suggests it is better to use code 128 as it has a check digit, hence less scanning errors
 - rating “Cannot remember last error 🖱️” (as judged by helpdesk)
- ▶ The Dlls are provided. After they are installed, the function to convert to the barcode is available.
- ▶ Convert the SAMPLE_NUMBER to text and pass it to **BarcodeC128A** function in a Crystal formula



3. Label Printer Control Language

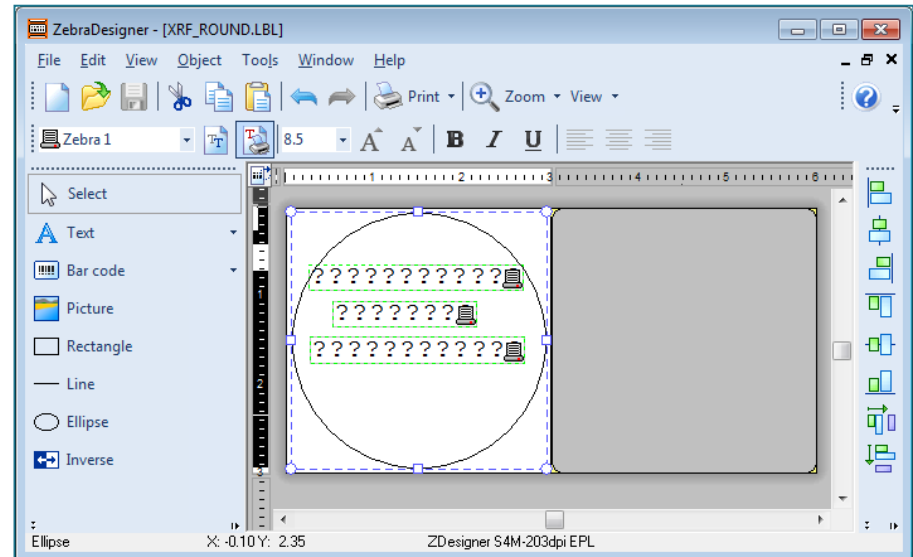
Most BC Printer have their own Control Languages, eg. EPL, ZPL, IPL
We will demo EPL for Zebra Printer

There is a manual you can study, or ... there is the easy way.



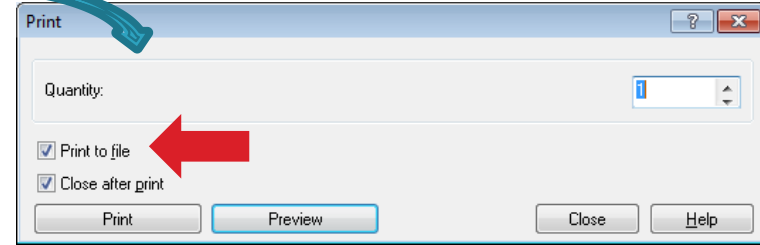
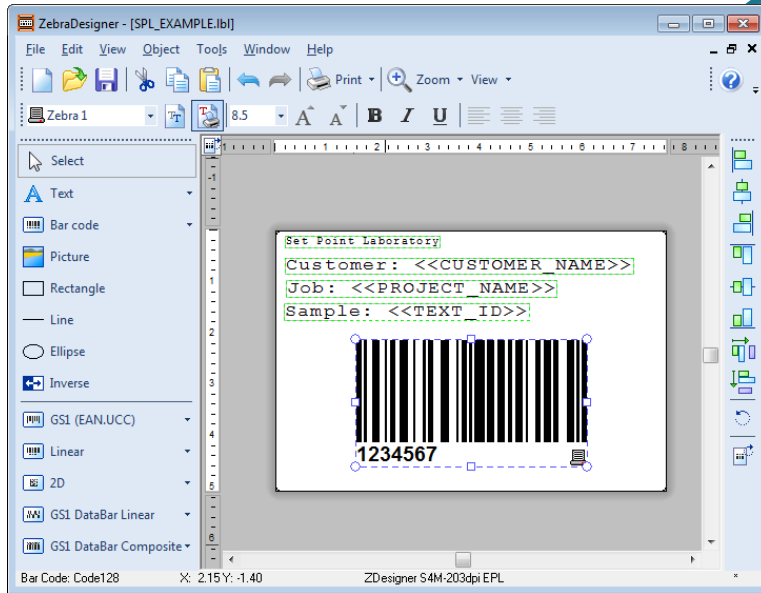
The Easy Way

- ▶ Install the free software, eg Zebra Designer 2 (the Pro version is licensed)
- ▶ Design a label
- ▶ Print it to file
- ▶ Edit the file
- ▶ Write a subroutine

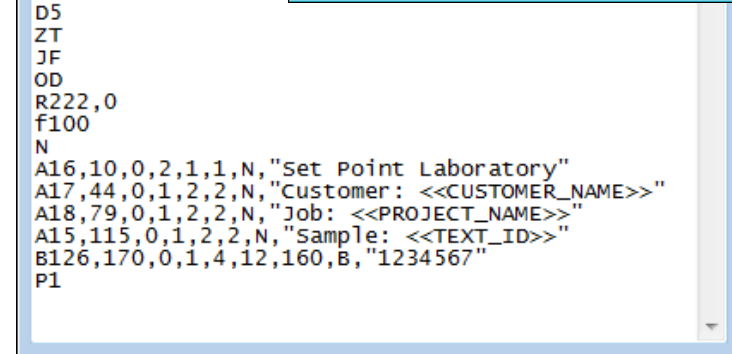
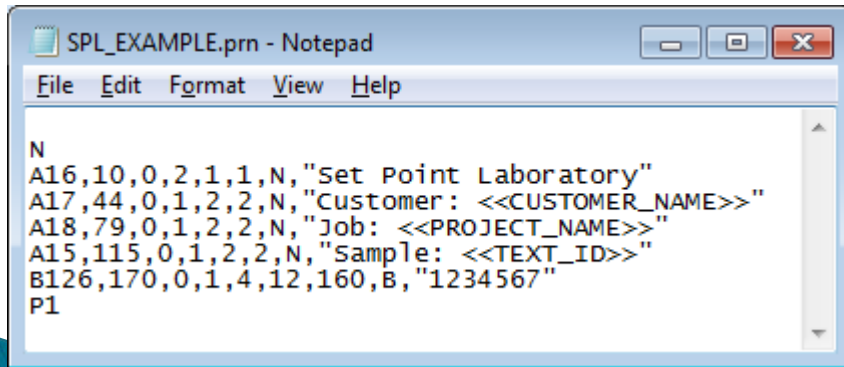
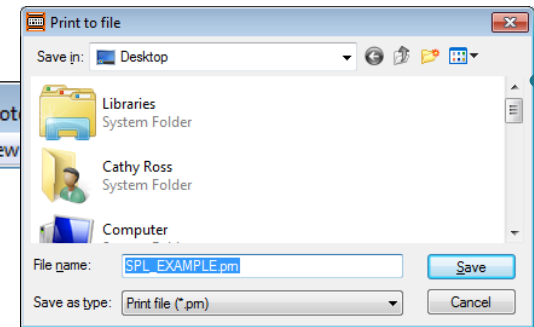


Design the label

1. Design the label with <<text place holders>> for the values from the Database



2. Print label to file



4. Save the file
3. Open with Notepad & delete extra commands above the N label start code

Write the subroutine – Retrieve Label Template

- ▶ Store the label somewhere, in a table or file where it can be retrieved in one of the following ways

' Stored in the subroutine table

```
sSQL = "select SOURCE_CODE from SUBROUTINE where NAME = 'DEMO_LABEL_TEMPLATE'"  
status = SQL(sSQL, "arrLabel")  
sLabelTemplate = arrLabel[1,1]
```

' Stored in the label table

```
sSQL = "select FORMULA from LABEL_LINE where PRINTER = 'DEMO_LABEL_TEMPLATE'"  
status = SQL(sSQL, "arrLabel")  
sLabelTemplate = arrLabel[1,1]
```

' Stored in the report folder

```
pathName = GetReportsDir()  
fileName = pathName & "SPL_EXAMPLE.prn"  
treatAsText = "T"  
sLabelTemplate = FileContents(fileName, treatAsText)
```

Write the subroutine – Select samples to print

Write the SQL statements to retrieve the samples

This will be site specific, as will the particular fields.

Note: Batches, Lots, etc could be selected, not just samples

```
'Select the project
```

```
qtName = "PROJECT_BROWSE"
```

```
status = ExecuteQueryTag(qtName, "retArray")
```

```
projectName = retArray[1,1]
```

```
IF (IsEmpty(projectName)) THEN
```

```
    RETURN
```

```
ENDIF
```

```
' Select samples
```

```
sSQL = "Select p.customer, s.text_id, s.sample_number from sample s join project p on  
    p.name = s.project where p.name = '" & projectName & "'"
```

```
status = SQL(sSQL, "arrSamples")
```

```
numSamples = UBound(arrSamples, 3)
```

```
' Select samples
```

```
sSQL = "Select p.customer, s.text_id, s.sample_number from sample s join project p on  
    p.name = s.project where p.name = '" & projectName & "'"
```

```
titleString = "Select labels to print"
```

```
multiSelectFlag = "T"
```

```
numSamples = SQLSelect(sSQL, titleString, "arrSamples", multiSelectFlag)
```

```
' Printing variables
```

```
printer = "Generic / Text Only"
```

```
uniCode = "F"
```

```
fileName = "Unicode.log"
```

Write the subroutine – Method 1

Use the Replace function on a String variable

Note: here we left the SAMPLE_NUMBER placeholder as 1234567 – you could change it to << SAMPLE_NUMBER >> in Notepad

' Using Replace

```
FOR x = 1 TO numSamples
    sCustomer = arrSamples[x,1]
    sTextID = arrSamples[x,2]
    sampleNo = arrSamples[x,3]
    sampleNo = Str(sampleNo)
    jobname = "Sample " & sampleNo
    sLabel = sLabelTemplate

    sLabel = Replace(sLabel, "<<CUSTOMER_NAME>>", sCustomer)
    sLabel = Replace(sLabel, "<<PROJECT_NAME>>", projectName)
    sLabel = Replace(sLabel, "<<TEXT_ID>>", sTextID)
    sLabel = Replace(sLabel, "1234567", sampleNo)

' Print raw variable
status = PrintRaw(printer, jobname, sLabel)
```

NEXT

Write the subroutine – Method 2

Use the FileFindReplace function on a file

Just another option, courtesy of Joshua Hammond on the LIMS List, but makes the addition of a picture on the label easier

```
status = ClearArray("findStringArray")
status = ClearArray("replaceStringArray")

findStringArray[1] = "<<CUSTOMER_NAME>>"
findStringArray[2] = "<<PROJECT_NAME>>"
findStringArray[3] = "<<TEXT_ID>>"
findStringArray[4] = "1234567"

' Using fileFindReplace
FOR x = 1 TO numSamples
  sCustomer = arrSamples[x,1]
  sTextID = arrSamples[x,2]
  sampleNo = arrSamples[x,3]
  sampleNo = Str(sampleNo)
  jobname = "Sample " & sampleNo

  replaceStringArray[ 1 ] = sCustomer
  replaceStringArray[ 2 ] = projectName
  replaceStringArray[ 3 ] = sTextID
  replaceStringArray[ 4 ] = sampleNo

  status = FileWriteContents(fileName, sLabelTemplate, uniCode)
  status = fileFindReplace(fileName, findStringArray, replaceStringArray)

' Print raw file
status = PrintFileRaw(printer, jobname, fileName)
NEXT
```

Write the subroutine – Complete 1 of 2

' Stored in the report folder

```
pathName = GetReportsDir()  
fileName = pathName & "SPL_EXAMPLE.prn"  
treatAsText = "T"  
sLabelTemplate = FileContents(fileName, treatAsText)
```

'Select the project

```
qtName = "PROJECT_BROWSE"  
status = ExecuteQueryTag(qtName, "retArray")  
projectName = retArray[1,1]  
IF (IsEmpty(projectName)) THEN  
    RETURN  
ENDIF
```

' Select samples

```
sSQL = "Select p.customer, s.text_id, s.sample_number from sample s join "  
sSQL = sSQL & " project p on p.name = s.project where p.name = '" & projectName & "'" "  
titleString = "Select labels to print"  
multiSelectFlag = "T"  
numSamples = SQLSelect(sSQL, titleString, "arrSamples", multiSelectFlag)
```

' Printing variables

```
printer = "Generic / Text Only"  
uniCode = "F"  
fileName = "Barcode.log"  
status = ClearArray("findStringArray")  
status = ClearArray("replaceStringArray")
```

Write the subroutine – Complete 2 of 2

```
findStringArray[1] = "<<CUSTOMER_NAME>>"
findStringArray[2] = "<<PROJECT_NAME>>"
findStringArray[3] = "<<TEXT_ID>>"
findStringArray[4] = "1234567"

' Using fileFindReplace
FOR x = 1 TO numSamples
    sCustomer = arrSamples[x,1]
    sTextID = arrSamples[x,2]
    sampleNo = arrSamples[x,3]
    sampleNo = Str(sampleNo)
    jobname = "Sample " & sampleNo

    replaceStringArray[ 1 ] = sCustomer
    replaceStringArray[ 2 ] = projectName
    replaceStringArray[ 3 ] = sTextID
    replaceStringArray[ 4 ] = sampleNo

    status = FileWriteContents(fileName, sLabelTemplate, uniCode)
    status = fileFindReplace(fileName, findStringArray, replaceStringArray)

' Print raw file
status = PrintFileRaw(printer, jobname, fileName)
NEXT
MsgBox(Str(numSamples) & " labels printed")
```

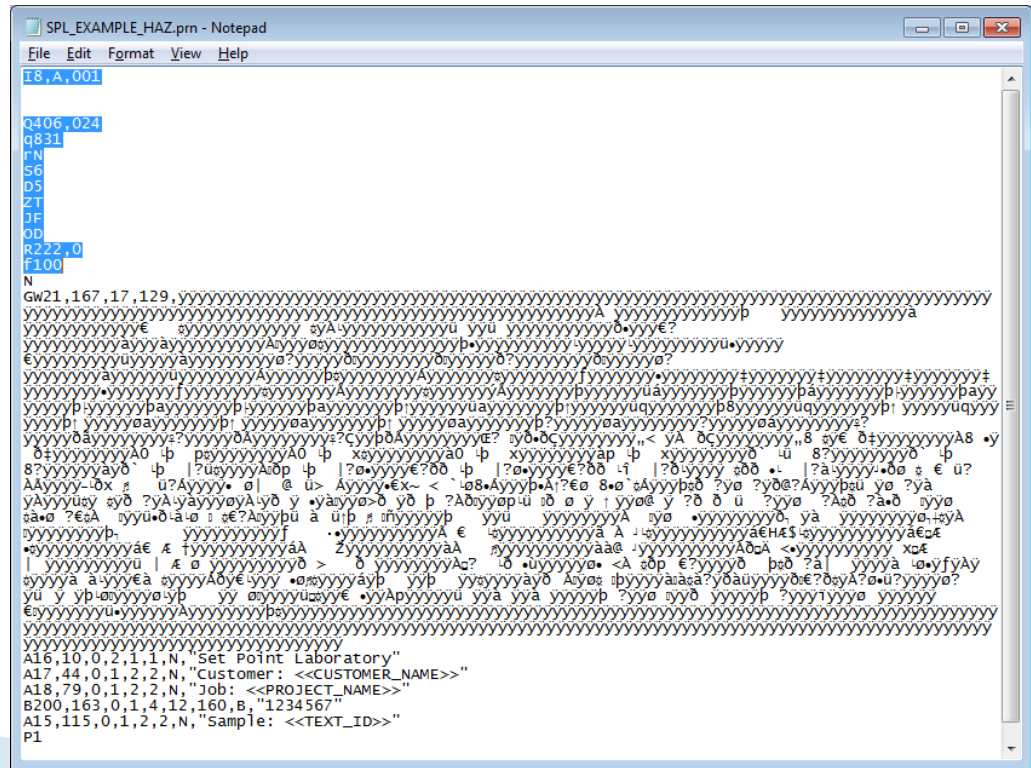
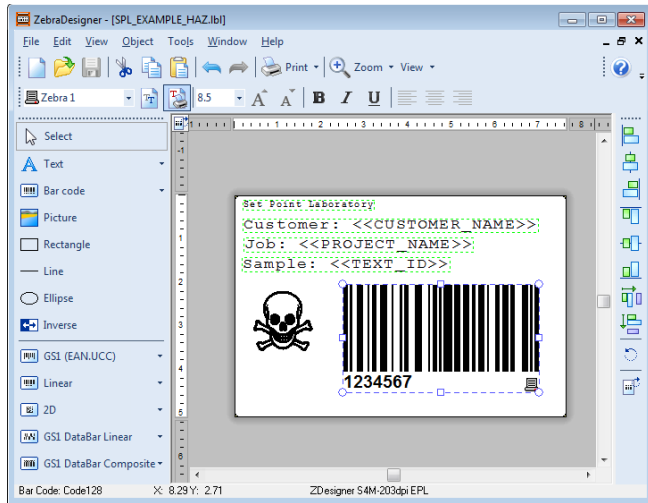
Adding a graphic on the Label

- ▶ Create the label in the designer as before
- ▶ Add the graphic - several come with the software
- ▶ Print to File

The file created will have the picture as code (line starting GW...), don't change it

- ▶ Delete commands before the N, as before
- ▶ Change the subroutine code to conditionally use the hazard label if the sample is hazardous

Thank you Again LIMS List (Marc Dupraz)



4. PLC and LW Label Printer Table

If you need the simple triggering of the label as in the first method (little or no LIMSBasic) but the label needs a enhanced formatting, combine Methods 1 & 3 (Also called Label Printing without LW Drivers)

Steps

- ▶ In the Client Configuration, set the driver to TextOnlyDriver
- ▶ In the Label Printer Table, use the Static and Formula field types
- ▶ Copy each line from the designer file into Static or formula fields
- ▶ Set the Label ID on the SLT, or call the subroutine, as before

Import Files	Yes
Label Printer Port	Generic / Text Only
Label Printer Type	TextOnlyDriver

Label Dialog

Line	Field Type	Bar Code	Justify	Label	Value
1	Static	No	Left		N
2	Static	No	Left	A5,5,0,1,1,1,N,"Set Point Laboratories"	
3	Formula	No	Left	sDQ = Chr(34) ' Double Quote character	customer = SELECT SAMPLE.CUS
4	Static	No	Left		
5					
6					
7					

Label Properties

Bar Code: Yes No

Field Type:

Justification:

Label... OK

Formula Dialog

```

1 sDQ = Chr(34) ' Double Quote character
2 customer = SELECT SAMPLE.CUSTOMER
3 sLine = "A100,37,0,1,2,2,N," & sDQ & customer & sDQ
4 RETURN sLine
5
6
7
8
9
10

```

Using the above to Improve Set Point Labels

Set Point Label Printing subroutine has several parameters
 It needed to be modified to
 “Print 3 round labels across, not 2”

It had been “copied” from a legacy VBA Macro. After 3 years of hacking, it ended up with 775 lines of code (and the occasional comment)

Even the original developer could not modify it

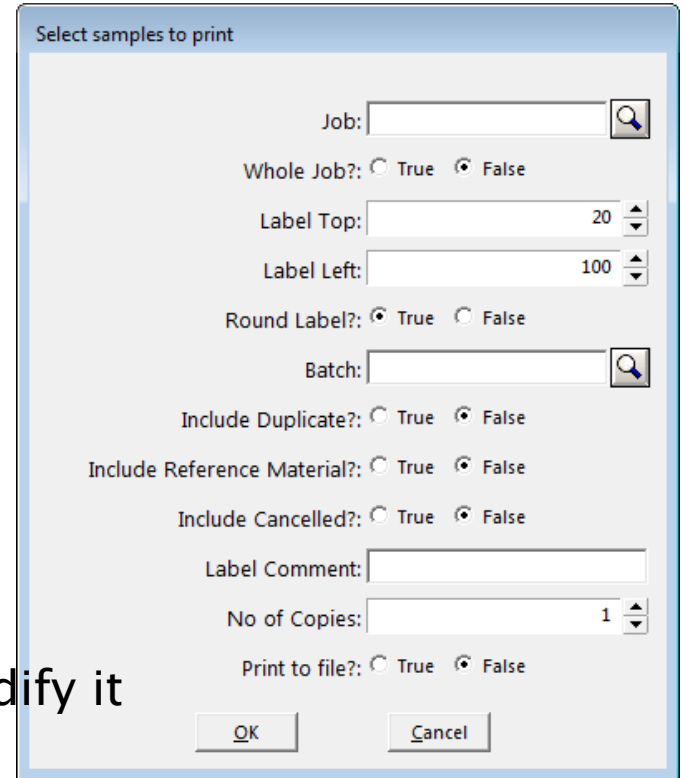
Using the techniques learnt above lines 340 – 680 (340 lines) were replaced with 60 lines of code, including the new requirement

The change will have a 2/3rds saving in label printing costs in XRF

```

Sub PrintLabels (JobID As String, JobName As String, JobDate As Date, JobTime As Date, JobLocation As String, JobOperator As String, JobStatus As String, JobPriority As String, JobType As String, JobMaterial As String, JobSample As String, JobResult As String, JobUnit As String, JobError As String, JobWarning As String, JobInfo As String, JobComment As String)
    Dim JobID As String
    Dim JobName As String
    Dim JobDate As Date
    Dim JobTime As Date
    Dim JobLocation As String
    Dim JobOperator As String
    Dim JobStatus As String
    Dim JobPriority As String
    Dim JobType As String
    Dim JobMaterial As String
    Dim JobSample As String
    Dim JobResult As String
    Dim JobUnit As String
    Dim JobError As String
    Dim JobWarning As String
    Dim JobInfo As String
    Dim JobComment As String

    'Print Labels
    PrintLabels JobID, JobName, JobDate, JobTime, JobLocation, JobOperator, JobStatus, JobPriority, JobType, JobMaterial, JobSample, JobResult, JobUnit, JobError, JobWarning, JobInfo, JobComment
End Sub
  
```



The screenshot shows a dialog box titled "Select samples to print". It contains several input fields and radio buttons for filtering samples. The fields include:

- Job: (text input with search icon)
- Whole Job?: (radio buttons for True and False, with False selected)
- Label Top: (spin box with value 20)
- Label Left: (spin box with value 100)
- Round Label?: (radio buttons for True and False, with True selected)
- Batch: (text input with search icon)
- Include Duplicate?: (radio buttons for True and False, with False selected)
- Include Reference Material?: (radio buttons for True and False, with False selected)
- Include Cancelled?: (radio buttons for True and False, with False selected)
- Label Comment: (text input)
- No of Copies: (spin box with value 1)
- Print to file?: (radio buttons for True and False, with False selected)

 At the bottom are "OK" and "Cancel" buttons.

Pros and Cons

	LabWare Drivers	Crystal Reports	Printer Control Language
Pro's	Quick, Easy, no programming	Easy if you know Crystal	Fast printing throughput
	One label config for many printer types	Very flexible	Precise, detailed labels
	Formulas can be used for some flexibility	Barcode can be compressed	
		One label configuration can be used for many printer types	
		Any printers can be selected	Any printers can be selected
Con's	Only for printers on the printer type list	Barcode font or BC Printer windows driver must be installed on client	Difficult to learn
	Limited control of layout	Page orientation problems	A lot of LIMSBasic may be needed, slower development
	Limited flexibility	Slower Label printing throughput	Labels are printer model & Language specific
	Only 5 symbologies		
	One printer per client		

Thank You

▶ Acknowledgements

(Some of our dearest friends)

- LabWare Knowledge Track
 - KT00699 – Printing Barcode Labels
 - KT00303 – Recommendations for Bar Code Type
 - KT00545 – Using native label printer code (ZPL) vs Crystal Reports
 - KT00572 – Some notes on bar-code quality

- LIMS List
- Google

- Support from Set Point Management

▶ THANK YOU and Get Printing!

▶ Questions?

or Email us at ZeniM@sethold.com, CathyR@sethold.com

