From zero to zHero: zOA - z optimized applications z/VSE - COBOL



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Disclaimer

This document was created as an instruction guide for the "From zero zo zHero: zOA - z optimized applications" workshop in Germany and is no official IBM reference guide.

1 Lab Overview

In this lab you will use WebSphere Developer for zSeries to develop COBOL Batch and Online applications for z/VSE.

You will perform the following steps for a batch and a CICS online z/VSE application:

- Establish a connection to z/VSE
- Create a z/VSE project
- Import sources from z/VSE into the project
- Edit / syntax check source
- Remote compile and link
- Run the application

2 Introduction and general hints

This lab guide is intended as an introduction for people to become familiar with application development on z/VSE.

You should not need any COBOL skills to run through these labs, but basic knowledge of z/VSE and Mainframe technologies are required to understand them.

Here are some general hints that you should read before you begin with this lab:

- This lab guide is also available as PDF-document on your workstation under C:\VSEWorkshop\VSEBatchCICS.pdf.
- When you copy content from the lab guide and paste it into development tools, always be aware that some line breaks in this document might cause failures. In that case, remove the line break.
- Here are some general hints for z/VSE:
 - When you are requested to press <enter>, please press the right
 <CTRL> key when you are using Personal Communication (3270 Emulator)!
 - You can only enter data in special screen areas. Use the <TAB> key to go to the next typo field
 - If you try to enter data in a non-typo area, your keyboard will be locked (see red sign, last line, left side (B J à)

For this lab we will use a VMW are Image with the following software installed:

- WebSphere Developer for zSeries (WDz) V6.0.1.6
- z/VSE Plugin from QGroup V1.0
- CICS Transaction Server for Windows V5 (CICS TS)
- IBM Personal Communication (PCOM)

3 System information and settings

	Value	Comment
VSE userid	TE##	
VSE password	team##	
Hostname/IP	192.168.0.2	
Ports	23	Telnet 3270
	2893	VSE Connector Server
Workshop files	c:\VSEWorkshop	
Location of VSE source	PRIMARY.TE##	
Phase name batch	STARTAPP	
Location of batch phase	PRIMARY.TE##	
Phase name CICS	TIME##	
Location of CICS phase	PRIMARY.WKSHOP	Is included in the CICS Libdef

4 Getting started

This chapter explains how to launch WDz with the appropriate workspace.

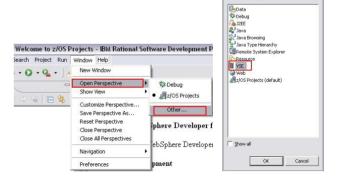
1.) Launch WDz by double-clicking on the following icon on the desktop



2.) Modify the workspace location as follows: C:\Documents and Settings\wdz\IBM\rationalsdp6.0\VSEWorkshop

Workspace	auncher		
Select a work IBM Rational Select the wo	cspace Software Development Platform stores your project rkspace directory to use for this session.	s in a directory called a	workspace.
Workspace:	C:\Documents and Settings\wdz\IBM\rationalsdp6.C	0\V5EWorkshop	Browse
Use this a	the default and do not ask again		
		0	K Cancel

3.) Switch to the VSE perspective:



Press OK.

4.) Close the welcome window:

🕼 Welcome to z/OS Projects 🖂		₩V5E Syste 🛛 🔍 🗆	@Welcome 🖾
z/OS Application Development		B ⊕ ₩ VSE SYSTEM	Welcome
Welcome to WebSphere Developer for zSeries	×		Software Platform

Select Perspective

5 Establish a z/VSE connection

5.) Right-click in the VSE System View and press New Connection.



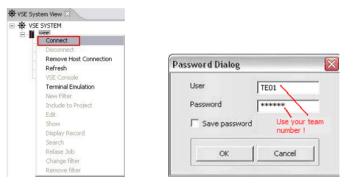
6.) Enter the following values and press finish:

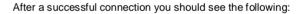
New connect	tion		
Host Connection Properties for cre	ation a new Host connectio	n.	k
Host name Port Connection name Description	192.168.0.2 2893 VSE VSE Lab System		
		Einish	Cancel

7.) Your connection should look like this:



8.) Right-click on your VSE System and choose **connect**. Logon with your userid (**TE##**) and your password (**team##**).





₩ VSE System View 🛛
E 🖶 VSE SYSTEM
E VSE
🛨 😨 Librarian
Power
😟 📄 VSAM
🗄 😰 ICCF
E Console

You should notice the changed icon and the plus signs in front of the subsystems when the connection was successful.

9.) Navigate to your programs by clicking on the + before Librarian, then open the library **PRIMARY** and your sub-library **TE##**

ℜ VSE System View ⊠	
□ ★ VSE SYSTEM	
E VSE	
🖻 🖳 Librarian	
PRD1	
PRD2	
PRIMARY	
C \$\$C	
F. C FRAN	
MILD.	
- OPER	
PROG	
- SYSA	
C SYSB	
C SYSC	
🗄 🧰 QGRP	
	Use your team number!
C PRINTAPP.C	····,
C STARTAPP.C	
c) TIMEZONE.C	
TEO2	
- 1606	

These 3 members will be used later in the workshop.

6 Using the VSE Console

10.) To open the VSE console double-click the **console** icon under your VSE connection. You can issue VSE commands in the **Command** line. Press enter to activate your command.

F1	PF2	PF3	PF4 PF	=5 PF6	5 Enter	PA1	Attn	NewLine	
PF7	PF8	PF9	PF10 PF	=11 PF:	12 Clear	PA2	SysReq	NextPad	+ C
t Propertie	Host Con	nection							
note Error I	ist Problem	Tasks	VSE Console 🔀						
æ 🛙 📃									
22 0111	TD1200	. Falan	TCP/IP Coan						
NAP	1FR300.	I Enter	TCF/TF COID	tanu					
AR 0015	SPACE	AREA	V-SIZE	GETVIS	V-ADDR	UNUSED	NAME		
AR 0015		SUP	712K		0	OHOOLD	SSASSUPI		
AR 0015		SVA-24	1868K	1772K	B2000	768K			
AR 0015		BG V	1280K	4864K	500000	65536K			
AR 0015		F1 V	1400K	3720K	500000	OK	POVSTART		
AR 0015		F2 V	2048K	49152K	500000		CICSICCF		
AR 0015		F3 V	600K	14760K	500000		VTAMSTRT		
AR 0015		F4 V	2048K	18432K	500000	OK			
AR 0015		F5 V	768K	256K	500000	OK			
AR 0015		F6 V	256K	256K	500000	OK			
AR 0015		F7 V	1024K	19456K	500000	OK	TCPIPWK		
AR 0015		F8 V	2048K	49152K	500000	OK			
		F9 V	256K	256K	500000	0K			
AP 0015		FA V	256K	256K	500000	OK			
AR 0015				512K	500000		SECSERV		
AR 0015	в								
AR 0015 AR 0015 AR 0015 AR 0015	; В	FB V SVA-31	512K 7584K	6752K	4B00000				

7 Create a VSE project for batch

11.) Right-click in the project view and select **New -> VSE Project**.



12.) Enter the following values. Choose the VSE system using the drop down box and choose as Job name **BATCH##** and enter Obj. library, Inc. library and Phase library: **PRIMARY.TE##**. Phase name is **STARTAPP**.

🙆 New Lokale V	SE Project	×
VSE-Project Wize		E
Create a new pro	oject residing on the workstation (instead of VSE)	6
Project name:	VSEBatch	
Job name:	BATCH01	_
System name	VSE	*
	DISP CLASS PRI	
JOB:	D A 9 number !	
LST:	003///	
Obj. library:	PRIMARY.TE01	
Inc. library:	PRIMARY.TE01	_
Phase name:	STARTAPP	_
Phase library:	PRIMARY.TE01	_
Source contains C	acs 🗆	
Skeleton path	Browse	
	< Back Next > Einish Can	cel

🕑 New Lokale	VSE Project		🗵	New Lokale VSE Project	X
VSE SQL Propert SQL Settings for			K	Options for local COBDL compiler Fill in the required compiler options for the local COBOL compile.	đ
Source contains S	squ T			Comple Options: [TEST,ADATA,EUT(ADEXIT(PTTFDBKW)))	
DB2 library: DB2 sublibrary:				STSUB:	
Database name:					Ξ
DB2 User: DB2 password:				Source contains embedded SQL froms	
C RR	0.0	C UR	CUSER	New Comeston	
Block	Г			Other SQL options	_
				Trivoke pre-processor	
				Pre-processor Options:	-
				Environment Variables (Set Statements):	-
				(4)	

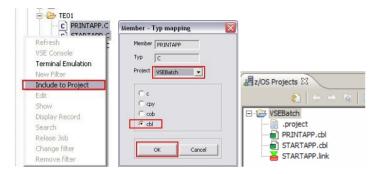


Press Finish. You should have the following:

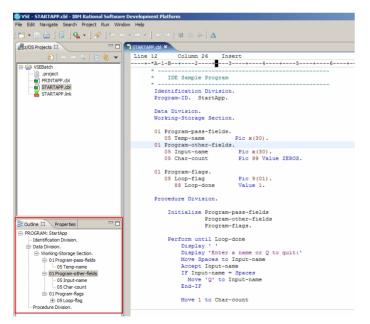


8 Edit, Compile and Link batch program

13.) Right-click on the two sources **PRINTAPP.C** and **STARTAPP.C** in your sublibrary **TE##** and choose **Include to Project**.



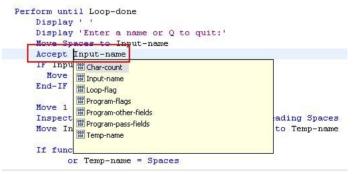
14.) Double-click on STARTAPP.cbl in the project view to open the Live Parsing Extensible Editor (LPEX). You can navigate in the outline view; the position in the outline view will be synchronized with the position of the curser in the editor.



15.) You can open the COBOL language help by selecting a COBOL keyword and pressing F1. The opening of the help may take some time, but it is recommended to minimize the help window. The next time you use it, will bring it up much faster.

Line	30	Column	19	Insert
+-	*A-1-	-B+	+-	3+4+5+
	*			
	*	IDE Sample	e Prog	ram
	*			
		ntificatio:		
	Pro	gram-ID.	StartA	.pp.
	Det	a Division		
		king-Stora	12/12 (tion
	WOL.	king-Scora	ge Jec	cron.
	01	Program-pa:	ss-fie	lds.
	1	05 Temp-nam	ne	Pic x(30).
	01 3	Program-ot:	her-fi	elds.
		05 Input-n	ame	Pic x(30).
		05 Char-co	unt	Pic 99 Value ZEROS.
	01	Program-fl:	ags.	
		05 Loop-fla	ag	Pic 9(01).
		88 Loop	-done	Value 1.
	Pro	cedure Div	ision.	
		Initializ	Prog	ram-pass-fields
			Prog	ram-other-fields
			Prog	ram-flags.
		Perform u	ntil L	oop-done
		Displa		
		Displa	ay 'En	ter a name or Q to quit:'
		Move	paces	to Input-name
		Accep	Inpu	it-name
		IF In	put-na	me = Spaces

16.) Move the cursor right before the "Input-name" and press STRG + space. This will show you the content assist functionality which shows all possible keywords or variables defined in your working storage section.



17.) We will now change the profile of the editor to behave like XEDIT on z/VM. Select **Window -> Preferences**.

Window Help	
New Window	
Open Perspective Show View	1
Customize Perspective Save Perspective As Reset Perspective Close Perspective Close All Perspectives	
Navigation	<pre>iartApp.</pre>
Preferences	

Select LPEX Editor then choose xedit, press Apply and then leave by pressing OK.

Preferences			
Workbench	LPEX Editor		
E-Ant	Editor profile		
Build Order	brief		
E- Crystal Reports F- Data	emacs		
- ESQL	epm		
Help	ispf		
Importer	lpex seu		
Install/Update			
Internet	xedit 2.		
J2EE	Disable parsing		
Java			
Appearance Block Compare Controls Find Text Print Save Tabs User Actions User Commands User Commands			
			3.
User Mouse Actions			
C:\Documents and Sett			
		Reset Restore Defau	ts <u>A</u> pply

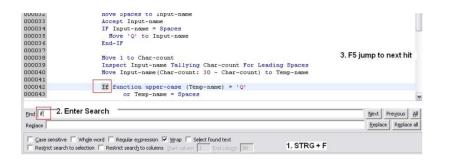
18.) You will see that the editor now shows line numbering on the left; this is prefix area where XEDIT commands can be issued. Try out the following copy command (CC). P means inserting previously and F would insert following, after the character.

🗐 STARTAPP.cbl 🛛	3	
Line 26	Column 1 Insert	
	+-*A-1-B+2+	-3+4+5
000013	05 Input-name	Pic x(30).
000014	05 Char-count	Pic 99 Value ZEROS.
000015		
000016	01 Program-flags.	
000017	05 Loop-flag	Pic 9(01).
000018	88 Loop-done	Value 1.
000019		
000020	Procedure Division.	
000021		
cc	Initialize Program	m-pass-fields
000023	Progra	m-other-fields
cc	Progra	m-flags.
000025		
P	Perform until Loop	p-done
000027	Display ' '	
000028	Display 'Ente:	r a name or Q to quit:'
000029	Move Spaces to	o Input-name
000030	Accept Input-	name

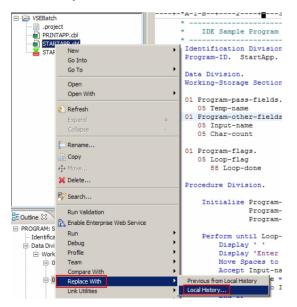
After your change the source has been modified, you will see the asterisk in front of your program name. Save the program with **STRG + S** or using the menu.

1	TARTAPP.C	ы	100
	Line 26	Column 1	
÷.	VSE	Batch/STARTAPP.cbl	-2
	000016	01 Program-f	1
	000017	O5 Loop-f	1
	000018	88 Loo	pr

19.) To search for expressions in your source code press **STRG + F. F5** brings you to next match. With **ESC** the search window will disappear.



 You can go back to any previously saved version of your program. Select your program STARTAPP.cbl and right-click then choose Replace With -> Local History.



The compare dialog shows you visually the differences. Note the white bar on the right side.

Local History of 'STARTAPP.cbl'	
(0ct.24, 2007)	
(1) [4:29:08 AM]	
Text Compare	
TARTAPP.cbl	O Local History (Oct 24, 2007 4:29:08 AM)
Procedure Division.	Procedure Division.
Initialize Program-pass-fields	Initialize Program-pass-fields
Program-other-fields	Program-other-fields
Program-flags.	Program-flags.
Flogram-Lidgs.	Flogram-riags.
Initialize Program-pass-fields	Perform until Loop-done
Program-other-fields	Display '
Program-flags.	Display 'Enter a name or Q to quit:'
Perform until Loop-done	Nove Spaces to Input-name
Display '	Accept Input-name
Display 'Enter a name or Q to quit:'	IF Input-name = Spaces
Hove Spaces to Input-name	Nove 'Q' to Input-name
Accept Input-name	End-IF
IF Input-name = Spaces	DIN II
Nove 'Q' to Input-name	Hove 1 to Char-count
End-IF	Inspect Input-name Tallying Char-count For Lea
End-17	Hove Input-name (Char-count: 30 - Char-count) t
Hove 1 to Char-count	nove inpac-name (char-count, 50 - char-count) c
Inspect Input-name Tallying Char-count For Leading	If function upper-case (Temp-name) = 'Q'
Move Input-name (Char-count: 30 - Char-count) to Te	or Temp-name = Spaces
nove input-name(char-count: 50 - char-count) to it	
	Set Loop-done to true
If function upper-case (Temp-name) = 'Q'	Else
or Temp-name = Spaces	Call 'Print&pp' using Program-pass-fields
Set Loop-done to true	End-if End-perform.
Else	End-perform.

21.) We will now bring an error in the application. E.g. move a space in Division keyword, **don't forget to save**!

0019	
0020	Procedure D ivision.
0021	
0022	Initialize Program-pass-fields
0023	Program-other-fields
0024	Program-flags.
0025	
0026	Perform until Loop-done
0027	Display ' '

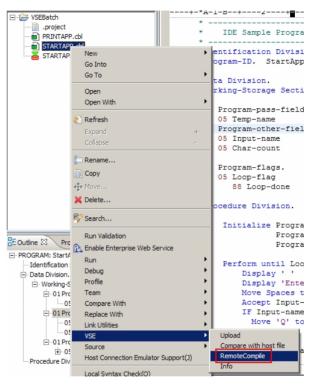
22.) To verify the syntax of your COBOL program right-click it and select Local Syntax Check. This will invoke the local COBOL compiler and bring you syntax errors in the Remote Error List.

----+-*A-1-B--+-

000032 000033					
000032					
000032	Lind II				
000032	End-IF				
	Hove 'Q'	to Input-name			
000030		me = Spaces			
000029	Move Spaces Accept Inpu	to Input-name	2		
000028	Display 'En	ter a name or		t:'	
000026	Perform until L Display ' '	oop-aone			
000025	Perform until L	con-done			
000024		ram-flags.			
000023		ram-other-fiel			
000021	Initialize Prog	ram-nass-field	ia		
000019 000020	Procedure D ivision	a			
	Properties(1)		f 0 message Message		
	Open Welcome Page(0)		List 🕅		
	Local Syntax Check(Q) Nominate as Entry Point	(Z)			
Procedure Div	Host Connection Emulato	or Support(J)			
E-01P	Source	+	м		
0 01Pr	VOE	•	Ê		
-0	cinic o diruco	•	Е		
E 01 Pr		•	I		
-0	5 Compare With	+	A		
⊡ 01 Pr		+	М		
- Working-		•	Ē		
 Data Division. 		•	D		
 PROGRAM: Start Identification 		•	Perfo		
Outline 🛿 🔪 Pro	Enable Enterprise Web S	ervice			
	Run Validation				
	Sy search		Initi		
	Search		ocedure		
	💢 Delete				
	◆\$+ Move		88		
	Сору		05 Loo		
	ERename		Progra		
			05 Cha		
	Collapse		05 Inp		
	Expand	+	Progra		
	8 Refresh		Progra 05 Tem		
	Open With	•			
	Open		rking-S		
	Go To	•	ta Divi		
_	Go Into		ogram-I		
- A STARTAR			entific		
STARTAR	10				
- DRINTAP	P.cbl	* -	IDE S		

The **Remote Error List** shows local and remote errors. Double-click on the error brings you to the location in the editor where the error occurs. Notice the red bullet in the editor.

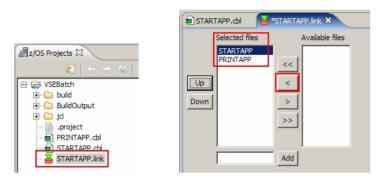
23.) Remote compile STARTAPP.cbl and PRINTAPP.cbl by right-clicking on each source file and the choosing **VSE -> Remote Compile**.



You should get a clean compile with return code 0. Otherwise fix the errors until you get 0.

RemoteBuild BATCH01	
Job BATCH01 for file STARTAPP_jcl with max return c	ode 0 finished
	OK

24.) To link your application, double-click on the STARTAPP.link.Move the "available files" to the "selected files" using the left arrow button.The sequence is important, the first should be STARTAPP.



Save the link book.

25.) To perform the link right-click on the **STARTAPP.link** and select **VSE** -> **RemoteLink**. Return code 2 is OK.

VSEBatch VSEBatch United build United build	t	*	IDE Sample
.project		Id	entification
PRINTAPP.	chi	Pr	ogram-ID. St
STARTAPP.			
- A STARTAPP			ta Division.
	New	•	king-Storage
	Go Into		Program-pass
	Go To	•	05 Temp-name
	Open		Program-othe
	Open With		
	Open with	`	05 Char-coun
	🐑 Refresh		
	Expand	+	Program-flag
	Collapse		05 Loop-flag
			88 Loop-d
	節 Rename		
	Copy		ocedure Divis
	A Move		Initialize
	*		Initialize
🗄 Outline 🕄 🛛 Prop	💢 Delete		
- PROGRAM: StartAr	Ro Search		
Identification D	Ay Search		Perform unt
Data Division.	Run Validation		Display
-Working-St	Run	•	Display
🖃 01 Proc	Debug	•	Move Sp
- 05	Profile	•	Accept
🖃 01 Prog	Team	•	IF Inpu
05	Compare With	•	Move
- 05	Replace With	+	End-IF
⊡ 01 Proç — 05	Link Utilities		Move 1
Procedure Divis	VSE		RemoteLink
mocedure DIVIS	Source	(Upload
	Source	· · · ·	

9 Prepare JCL and run batch program

26.) We will import a JCL template to run the STARTAPP batch application. Choose **File -> Import** and select **File system**.

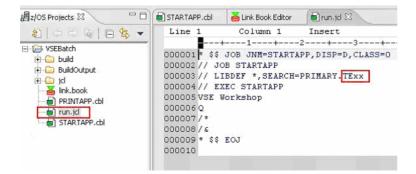
New	Alt+Shift+N 🕨
Close	Ctrl+F4
Close All	Ctrl+Shift+F4
Save	Ctrl+S
Save As	
🗟 Save All	Ctrl+Shift+S
Revert	
Move	
Rename	F2
Refresh	F5
Print	Ctrl+P
Switch Workspace	
Open External File	



Navigate to C:\VSEWorkshop and select **run.jcl.** Make sure the import folder is **VSEBatch**.

1	
i le system Import resources from the local file syste	em (A)
From directory: C:\VSEWorkshop	Browse
- 🔽 🗁 VSEWorkshop	
Filter Types Select All	Deselect All
	Browse
Into folder: VSEBatch	
and the second s	
Options:	ut warning
Options:	ut warning
	ut warning
Options: Qverwrite existing resources withou C greate complete folder structure	ut warning

27.) Open your run.jcl and modify the libdef to your team specifications. (TE##). Save.



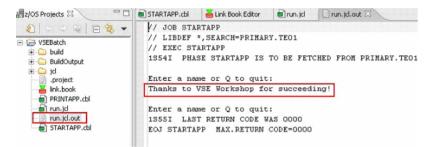
28.) To submit your job right-click on **run.jcl** and select **VSE -> Submit**. Check for the return code.

New	▶ EOJ
Go Into	
Go To	•
Open	
Open With	
🔊 Refresh	
Expand	+
Collapse	-
뒏 Rename	
Сору	
⇔ Move	
💥 Delete	
💞 Search	
Run Validation	
Run	
Debug	•
Profile	•
Team	•
Compare With	•
Replace With	•
Link Utilities	•
VSE	Submit
Source	▶ Upload
E Job Submit	
Submit of file run.jcl finisched wil	:h status 0 .
)	

To look at the job output do a Refresh on the project.

	Line 3
VSEE Vew Conto Conto Conto Conto	•
Show in Table(Q)	
Refresh	

Open **run.jcl.out** and check the output of your application.



Congratulations you have successfully finished the COBOL batch lab!!!

10 Create a VSE project for CICS

29.) Create a new VSE project (same as step 10.)) VSECICS. In the VSE-Project Wizard use the following values. For Job name use CICS##, for Sublibraries use TE##, Phase name use TIME## and the Phase sublibrary is the same for every group (WKSHOP). Remember to select the Source contains CICS checkbox.

🙆 New Lokale VS	E Project					×
VSE-Project Wiza	rd					
Create a new proje	ect residing on	the workst	tation (instead o	f VSE)		<u>s</u>
Project name:	VSECICS	2,52,52,62,62,	2,0,0,0,2,2,0,0	5° 4° 8° 8° 8° 8° 8° 8° 8° 8° 8° 8° 8° 8° 8°	0.0.0.8.9.0	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
Job name:	CICS01			2. M. B. S. M. M. S. S. S.		
System name	VSE DISP CLASS	S PRI		8 0 8 0 8 0 8 0 8 0 8 0 8 0 8 0 8 0 8 0	6 6 0 8 0 8 0 6 8 0 8 0 8 0 8 0 8 0 8 0	_
308:	DA		Use your tea number !	am : 0 : 0 : 0 : 0 : 0 : 0 : 0 : 0 : 0 :		
LST:	DQ	3/	11			
Obj. library:	PRIMARY.	TE00	/			
Inc. library:	PRIMARY.	TE00	<u></u>			
Phase name:	TIME01	/				
Phase library:	PRIMARY.	WKSHOP				
Source contains CI						
Skeleton path				Brow	se	
· · · · · · · · · · · · · · · · · · ·			8 7 7 7 8 8 7 1		V V V 8 0 0 8 -	
			< Back	Next >	Finish	Cancel
			80885880			

We will now continue with CICS ...

Skip the panel for SQL properties. On the panel for the local COBOL compiler options, enable the project for local syntax check with CICS select

the Invoke pre-processor check box. Then press Finish.

ptions for local COBOL compile		
Fill in the required compiler options i		
rii in che required compiler opdons i	for the local COBOL complet.	
ompile Options:		
TEST, ADATA, EXIT(ADEXIT(FTTFDE	3KW))	
YSLIB:		
Source contains embedded SQL		
-		Browse
		Drowse
New Connection		
ther SQL options		
7 Invoke pre-processor		
re-processor Options:		
re-processor Options:		
re-processor Options: CICS(COBOL2)	nts):	
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re-processor Options: CICS(COBOL2) nvironment Variables (Set Stateme	nts):	2
✓ Invoke pre-processor re-processor Options: CICS(COBOL2) invironment Variables (Set Stateme		2 Cancel

11 Edit, Compile and Link CICS Program

30.) Include the source TIMEZONE.C from your sublibrary (**TE##**) into your CICS project.

Member	TIMEZONE
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Project	VSECICS 💌
]
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C cob	1
📀 cbl	

- 31.) You can use again the LPEX Editor for modifying your source.
- 32.) Perform a local syntax check to invoke the local COBOL compiler and CICS pre-processor.
- 33.) Perform a remote compile on your TIMEZONE.cbl source within your VSE project. Verify that you have a clean compile.
- 34.) To link your application open the **TIME##.link** and move the **TIMEZONE** to the **selected files** side. Open the **settings** tab and make sure that CICS is selected (but not CICS HASM).



35.) Perform a remote link. Return code 2 is OK.

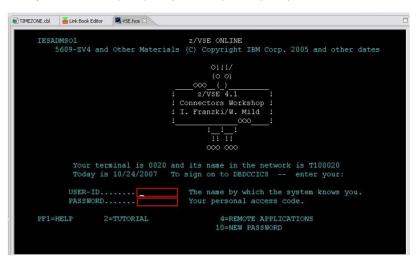
12 Run the CICS Application

The following CICS resource definitions **have already been done** for you, they are listed for your reference:

- 36.) CEDA DEFINE PROGRAM(TIME##) Language=COBOL Group=VSESPG
- 37.) CEDA DEFINE TRANS(TZ##) Program=TIME## Group=VSESPG
- 38.) INSTALL GROUP(VSESPG)
- 39.) Include PRIMARY.WKSHOP in the CICS Libdef.
- 40.) Open the integrated Terminal Emulation. Right click on your VSE system in the VSE System view and select "Terminal Emulation".

安 VSE S	YSTEM
	Connect
	Disconnect
	Remove Host Connection
	Refresh
	VSE Console
	Terminal Emulation
	New Filter
	Include to Project
	Edit
	Show
	Display Record
	Search
	Relase Job
	Change filter
	Remove filter

41.) Enter your VSE userid (TE##) and password (team##) and press enter.



- 42.) In the next screen press F6 to go to the CICS screen.
- 43.) Enter **TZ##** to start the CICS Transaction that invokes your program **TIME##**.



Congratulations you have successfully finished the COBOL CICS lab!!!