Deploying LANSA Applications on Linux

- About this Guide
- Deploy LANSA Applications to a Linux Server
- Execute Applications with a Linux Server
- Troubleshooting

Edition Date March 19, 2014
© LANSA
About this Guide

- This guide provides instructions for planning and deploying LANSA applications on a Linux Server. It does not include instructions or guidance in designing or creating applications with LANSA.
- The contents are written for technical support staff and LANSA developers.
- We recommend the use of the Korn shell (ksh) or Bourne shell (sh). All examples of Linux commands in this guide use the Korn shell.

It is assumed:

- Readers have a solid understanding of both the Linux operating system and LANSA.
- The application to be ported to Linux already works with a Windows Server.
- An experienced System Administrator (root user) of the Linux system is available to carry out system administration tasks and advise the reader on Linux issues.
- An ORACLE Database Administrator (DBA) is available to create and configure databases, create user ids and advise the reader on ORACLE issues.

Also see

Additional Information
Additional Information

For more details about LANSAn on Linux, refer to these guides:

- *Installing LANSAn on Linux*
- *LANSAn Communications Setup*
- *LANSAn Technical Reference*

For the latest product information, refer to the LANSAn product web site at [www.lansa.com/support](http://www.lansa.com/support)
1. **Deploy LANSA Applications to a Linux Server**

- Review *What is LANSA on Linux?* in the *Installing LANSA on Linux Guide*.
- Review the **1.1 Directory Structure for LANSA under Linux**.
- As a starting point go through the steps in the **1.2 Before You Begin Checklist**.
- It is strongly recommended that you get the DEM partition working in your Linux environment before you go ahead with deploying your own application to Linux. **1.3 Test with the Verification and Sample Applications** describes what this involves. RDML code has been provided that can be used with your own application or the DEM partition to ensure that you have everything set up properly. Refer to **1.5 Verification Application Code (L4WEX functions)**.
- Finally, **1.4 Deliver the Server Portion of an Application to Linux** describes how to export your application using the Deliver To feature in the LANSA Editor.

**Further Information**

- **1.1 Directory Structure for LANSA under Linux**
- **1.2 Before You Begin Checklist**
- **1.3 Test with the Verification and Sample Applications**
- **1.4 Deliver the Server Portion of an Application to Linux**
- **1.5 Verification Application Code (L4WEX functions)**

↑ 1. **Deploy LANSA Applications to a Linux Server**
1.1 Directory Structure for LANSA under Linux

The installation of LANSA will create a set of directories under $LANSAXROOT.

For each partition imported into LANSA, a new directory called x_ppp (where ppp is the 3 character partition identifier) will also be created.

The main directory structure is shown below:

![Diagram of directory structure]

The following directories are used to store information common to all partitions:

- $LANSAXROOT/x_lansa
- $LANSAXROOT/x_lansa/source
- $LANSAXROOT/x_lansa/bin

For example, libx_bif.so (the BIF shared library) resides in x_lansa/bin because it is composed of common routines shared by all LANSA generated applications.

Some of the types of objects stored in the source and bin sub-directories are:

<table>
<thead>
<tr>
<th>Directory</th>
<th>File Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>source</td>
<td>.c</td>
<td>C Code</td>
</tr>
<tr>
<td></td>
<td>.h</td>
<td>C Code header</td>
</tr>
</tbody>
</table>
.stg  C Code header - storage definitions
.unx  Compiler/linker make file
.xqi  DBID=*NONE useable read only index file
.xqd  DBID=*NONE useable read only data file
.xqf  DBID=*NONE useable read only flat file
.ctd  Common table definitions
.dat  Saved data for reload after table creation
.txt  UTF-8 user-defined text strings
.utx  C header for user-defined text strings
.log  Log from Deliver To processing

bin  .so  Executable shared library (equivalent to a Windows .DLL)
     None  Executable object (equivalent to a Windows .EXE)
     .sh  Shell script (equivalent to a Windows .CMD or .BAT file)

log  x_err.log  Fatal error log
     lroute.*  Comms log and trace files.

tmp  x_trace*  Trace files for LANSA runtime, when ITRO=Y is specified.
     .tmp  Temporary files

↑ 1. Deploy LANSA Applications to a Linux Server
1.2 Before You Begin Checklist

**Step**

1. Create a **Minimum Supported Configuration document** (MSC) defining the minimum configuration your solution will viably support. This includes what servers, client platforms and web browsers your application will need. Consider:
   - Hardware requirements
   - Software requirements
   - Supported screen resolutions
   - Networking capabilities
   - Maximum Data volumes.

2. Install and configure the latest version of LANSA on the Linux Server.

3. Request and install the appropriate licenses on the Linux Server.

4. Follow the instructions in the **LANSA Communications Setup Guide** to configure communications for the client and server machines.

5. Verify the clients can communicate with the Server via TCP/IP.

**Comments / Further Actions**

A formal **Minimum Supported Configuration (MSC) Document** will:

- Inform decisions about the overall solution cost
- Establish the environment required to test the deployment of the solution or any patch/hotfix made to it.
- Raise management's awareness of the risk of implementing a "sub-MSC" solution.

**Note** - Any other application running on this "end-user" environment must also be considered when sizing your machine.

SuperServer clients must not have a newer version of LANSA installed than the version of LANSA on the Linux Server.

Refer to the **LANSA website** for information.

The Client and Server can only communicate via TCP/IP.

On the client, use the PING command specifying the name or IP address of the server system.
Wait until the PING command gives a good return code indicating it could successfully communicate with the server system.

6. Before you deploy your own application, test your configuration of the clients and Lansa on Linux with the DEM partition and sample code.

Refer to 1.3 Test with the Verification and Sample Applications for details.

1. Deploy Lansa Applications to a Linux Server
1.3 Test with the Verification and Sample Applications

We strongly recommend that you import the sample DEM partition and get it working with the L4WEX functions (SuperServer) before attempting to use your own application. This will achieve 2 objectives:

1. It will allow any application connection or translation problems that you encounter to be assessed within an environment that both you and LANSAnsa support staff have available.

2. It will provide you with a basic example of deploying the server portion of an application to Linux, again in an environment that both you and LANSAnsa support staff have available.

Create the sample L4WEX functions, provided in 1.5 Verification Application Code (L4WEX functions) on the process menu L4WEXAM1.

Follow the instructions in 1.4 Deliver the Server Portion of an Application to Linux to deploy DEM to Linux.

Once you have everything ready, you should attempt to execute the verification process L4WEXAM1.

Follow the instructions in Executing Applications with a Linux Server to test with the verification process L4WEXAM1. The function L4WEX01 should be used as the starting point.

Once you have successfully tested the DEM partition, go ahead and deploy and test your own application.

If you plan to support non-English languages, you should also do some basic testing in an additional language, to ensure there are no codepage / locale issues. As the demo only ships with English, French, and Japanese text, you may need to enter some language-specific text, or use your own simple application code to test.

1. Deploy LANSAnsa Applications to a Linux Server
1.4 Deliver the Server Portion of an Application to Linux

These instructions assume that the tasks listed in 1.2 Before You Begin Checklist have been carried out.

Determine which system and application objects need to exist on the server. This means all files (and optionally, their data), and any reusable parts, Web objects, functions and their processes that will execute on the Server. These include trigger functions, system variable evaluation functions, RPCs (functions that will be called by CALL_SERVER_FUNCTION or LceLANSACall or LceSubmit), batch jobs that will be called directly from the command-line, and so on. Client-only objects, such as components and functions containing REQUEST, DISPLAY, or POP-UP commands do not need to be deployed to the Server.

Follow the instructions in Other Remote System Monitors in the Visual LANSA Administrator’s Guide to define the Linux deployment system, initialize the partition, and deliver your objects to the server.
1.5 Verification Application Code (L4WEX functions)

Refer to 1.3 Test with the Verification and Sample Applications for details on using the following code examples.

Client functions contain POP_UP and REQUEST commands so must be created as RDML, not RDMLX.

- 1.5.1 L4WEX01 Example of On Top Connect/Disconnect
- 1.5.2 L4WEX02 Exchange Example: Client Portion
- 1.5.3 L4WEX52 Exchange Example: Server Portion
- 1.5.4 L4WEX03 List Example: Client Portion
- 1.5.5 L4WEX53 List Example: Server Portion

↑ 1. Deploy LANSA Applications to a Linux Server
1.5.1 L4WEX01 Example of On Top Connect/Disconnect

Refer to 1.3 Test with the Verification and Sample Applications for details on using the following example.

FUNCTION OPTIONS(*DIRECT);

**********;

DEFINE FIELD(#L4W_AS400) TYPE(*CHAR) LENGTH(1) LABEL('AS/400')
DEFINE FIELD(#L4W_OTHER) TYPE(*CHAR) LENGTH(1) LABEL('Other')
DEFINE FIELD(#L4W_ANAM) TYPE(*CHAR) LENGTH(20) LABEL('Server Name')
DEFINE FIELD(#L4W_ONAM) TYPE(*CHAR) LENGTH(20) LABEL('Server Name')
DEFINE FIELD(#L4W_LOCK) TYPE(*CHAR) LENGTH(1) LABEL('Divert Locks')
DEFINE FIELD(#L4W_SHOWM) TYPE(*CHAR) LENGTH(1) LABEL('Startup Message')
DEFINE FIELD(#L4W_COMC) TYPE(*CHAR) LENGTH(1) LABEL('Commit Control')
DEFINE FIELD(#L4W_DBCS) TYPE(*CHAR) LENGTH(1) LABEL('DBCS Capable')
DEFINE FIELD(#L4W_CTST) TYPE(*CHAR) LENGTH(10) DESC('C-S Table') DEFAULT(ANSEBC1140);
DEFINE FIELD(#L4W_STCT) TYPE(*CHAR) LENGTH(10) DESC('S-C Table') DEFAULT(EBC1140ANS);
DEFINE FIELD(#L4W_EXEP) TYPE(*CHAR) LENGTH(2) LABEL('Exec Priority') DEFAULT('''20''');
DEFINE FIELD(#L4W_RETC) TYPE(*CHAR) LENGTH(2) LABEL('Return Code');
DEFINE FIELD(#L4W_USER) TYPE(*CHAR) LENGTH(10) LABEL('Server User') DEFAULT(*user);
DEFINE FIELD(#L4W_PSWD) TYPE(*CHAR) LENGTH(10) LABEL('Server Password')
DEFINE FIELD(#L4W_PROC) TYPE(*CHAR) LENGTH(10) LABEL('Call Process')
DEFINE FIELD(#L4W_FUNC) TYPE(*CHAR) LENGTH(7) LABEL('Call Function')
DEFINE FIELD(#L4W_BLKS) TYPE(*DEC) LENGTH(7) DECIMALS(0) LABEL('Blocking Size')
DEFINE FIELD(#L4W_TRC2) TYPE(*CHAR) LENGTH(1) LABEL('Trace Level 2')
DEFINE FIELD(#L4W_TRC4) TYPE(*CHAR) LENGTH(1) LABEL('Trace Level 4')
DEFINE FIELD(#L4W_TST1) TYPE(*CHAR) LENGTH(1) LABEL('Perform Test 1')
DEFINE FIELD(#L4W_TST2) TYPE(*CHAR) LENGTH(1) LABEL('Perform Test 2')
DEFINE FIELD(#L4W_APND) TYPE(*CHAR) LENGTH(1) DEFAULT(A);

**********;

DEF_LIST NAME(#SAVE1) FIELDS(#L4W_AS400 #L4W_OTHER #L4W_ANAM #L4W_ONAM #L4W_LOCK #L4W_SHOWM #L4W_COMC #L4W_DBCS #L4W_CTST #L4W_STCT #L4W_EXEP #L4W_PROC #L4W_FUNC #L4W_BLKS #L4W_TRC2 #L4W_TRC4)

DEF_LIST NAME(#SAVE2OUT) FIELDS(#L4W_APND #L4W_EARG) TYPE(*WORKING) ENTRIES(1);
DEF_LIST NAME(#SAVE2IN) FIELDS(#L4W_EARG) TYPE(*WORKING);
**********;
DEF_COND NAME(*L4W_OTHER) COND('#L4W_OTHER = "1"');
DEF_COND NAME(*L4W_AS400) COND('#L4W_AS400 = "1"');
DEF_COND NAME(*OKAY) COND('#L4W_RETC = OK');
DEF_COND NAME(*NOTOKAY) COND('#L4W_RETC *NE OK');
DEF_COND NAME(*TRACEL2) COND('#L4W_TRC2 = "1"');
DEF_COND NAME(*TRACEL4) COND('#L4W_TRC4 = "1"');
DEF_COND NAME(*TEST1) COND('#L4W_TST1 = "1"');
DEF_COND NAME(*TEST2) COND('#L4W_TST2 = "1"');
DEF_COND NAME(*NOTEST) COND('(#L4W_TST1 *NE "1") *AND (#L4
**********;
EXECUTE SUBROUTINE(LOAD_DFT);
POP_UP FIELDS((#L4W_AS400 *IN) (#L4W_OTHER *IN)) IDENTIFY(*L
EXECUTE SUBROUTINE(SAVE_DFT);
**********;
BEGIN_LOOP;
IF COND(*L4W_OTHER);
REQUEST FIELDS(#L4W_ONAM #L4W_LOCK #L4W_SHOWM #L4W_T AS400 Server Details ');
EXECUTE SUBROUTINE(BLD_ARGS);
USE BUILTIN(DEFINE_ANY_SERVER) WITH_ARGS(SERVER #L4W_OI
#L4W_ARG #L4W_LOCK #L4W_SHOWM) TO_GET(#L4W_RETC);
ELSE;
REQUEST FIELDS(#L4W_ANAM #L4W_LOCK #L4W_SHOWM #L4W_C USE BUILTIN(DEFINE_OS_400_SERVER) WITH_ARGS(SERVER #L4W_ ENDIF;
EXECUTE SUBROUTINE(SAVE_DFT);
IF COND(*OKAY);
USE BUILTIN(CONNECT_SERVER) WITH_ARGS(SERVER #L4W_PSWI IF COND(*OKAY);
USE BUILTIN(CONNECT_FILE) WITH_ARGS(*' SERVER #L4W_BLKS); IF COND(*TEST1);
CALL PROCESS(*DIRECT) FUNCTION(L4WEX02) EXIT_USED(*NEXT.
ENDIF;
IF COND(*TEST2);
CALL PROCESS(*DIRECT) FUNCTION(L4WEX03) EXIT_USED(*NEXT.
ENDIF;
IF COND(*NOTEST);
CALL PROCESS(#L4W PROC) FUNCTION(#L4W_FUNC) EXIT_USED(* ENDIF;
USE BUILTIN(DISCONNECT_FILE) WITH_ARGS('*' SERVER);
USE BUILTIN(DISCONNECT_SERVER) WITH_ARGS(SERVER) TO_GET
IF COND(*OKAY);
MESSAGE MSGTXT('Disconnection from server completed normally');
ELSE;
MESSAGE MSGTXT('Error detected when disconnecting from server');
ENDIF;
MENU;
ENDIF;
ENDIF;
END_LOOP;
**********;
SUBROUTINE NAME(BLD_ARGS);
DEFINE FIELD(#L4W_ARG) TYPE(*CHAR) LENGTH(256);
CHANGE FIELD(#L4W_ARG) TO(#L4W_EARG);
IF COND(*TRACEL4);
USE BUILTIN(BCONCAT) WITH_ARGS(#L4W_ARG 'ITRO=Y') TO_GET;
USE BUILTIN(BCONCAT) WITH_ARGS(#L4W_ARG 'ITRL=4') TO_GET;
ELSE;
IF COND(*TRACEL2);
USE BUILTIN(BCONCAT) WITH_ARGS(#L4W_ARG 'ITRO=Y') TO_GET;
USE BUILTIN(BCONCAT) WITH_ARGS(#L4W_ARG 'ITRL=2') TO_GET;
ENDIF;
ENDIF;
ENDROUTINE;
**********;
SUBROUTINE NAME(LOAD_DFT);
CLR_LIST NAMED(#SAVE1);
CLR_LIST NAMED(#SAVE2IN);
USE BUILTIN(TRANSFORM_FILE) WITH_ARGS(#SAVE1 *FUNCTION 'T IY 0 NONE #SAVE2IN) TO_GET;
GET_ENTRY NUMBER(1) FROM_LIST(#SAVE1);
GET_ENTRY NUMBER(1) FROM_LIST(#SAVE2IN);
ENDROUTINE;
********** COMMENT(Routine);
SUBROUTINE NAME(SAVE_DFT);
CLR_LIST NAMED(#SAVE1);
CLR_LIST NAMED(#SAVE2IN);
CLR_LIST NAMED(#SAVE2OUT);
ADD_ENTRY TO_LIST(#SAVE1);
ADD_ENTRY TO_LIST(#SAVE2OUT);
USE BUILTIN(TRANSFORM_LIST) WITH_ARGS(#SAVE1 *FUNCTION "T" I Y *BLANK Y #SAVE2OUT) TO_GET(#L4W_RETC);
ENDROUTINE;

↑ 1.5 Verification Application Code (L4WEX functions)
1.5.2 L4WEX02 Exchange Example: Client Portion

Refer to 1.3 Test with the Verification and Sample Applications for details on using the following code example.

```
FUNCTION OPTIONS(*DIRECT);

**********;
DEFINE FIELD(#L4W_TEST) TYPE(*DEC) LENGTH(7) DECIMALS(0) LABEL('Number of Tests') EDIT_CODE(4) DEFAULT(50);
DEFINE FIELD(#L4W_COUNT) TYPE(*DEC) LENGTH(7) DECIMALS(0);
DEFINE FIELD(#L4W_FC1) TYPE(*DEC) LENGTH(15) DECIMALS(0);
DEFINE FIELD(#L4W_FC2) TYPE(*DEC) LENGTH(15) DECIMALS(0);
DEFINE FIELD(#L4W_RSL1) TYPE(*DEC) LENGTH(15) DECIMALS(5);
DEFINE FIELD(#L4W_RSL2) TYPE(*DEC) LENGTH(15) DECIMALS(5);
DEFINE FIELD(#L4W_CMP1) TYPE(*DEC) LENGTH(15) DECIMALS(5);
DEFINE FIELD(#L4W_CMP2) TYPE(*DEC) LENGTH(15) DECIMALS(5);
DEFINE FIELD(#L4W_RETC) TYPE(*CHAR) LENGTH(2);

**********;
BEGIN_LOOP;
POP_UP FIELDS((#L4W_TEST *IN)) DESIGN(*DOWN) PANEL_TITL('Perform Test Number 1') EXIT_KEY(*NO) PROMPT_KEY(*NO);
BEGINCHECK;
RANGECHECK FIELD(#L4W_TEST) RANGE((1 100000)) MSGTXT('Number of test must be in range 1 to 100000');
ENDCHECK;

**********;
CHANGE FIELD(#L4W_FC1) TO(1);
CHANGE FIELD(#L4W_FC2) TO(#L4W_TEST);
BEGIN_LOOP USING(#L4W_COUNT) TO(#L4W_TEST);
CHANGE FIELD(#L4W_RSL1 #L4W_RSL2) TO(*NULL);
EXCHANGE FIELDS(#L4W_FC1 #L4W_FC2);
USE BUILTIN(CALL_SERVER_FUNCTION) WITH_ARGS(SERVER L4WEX52 Y Y) TO_GET(#L4W_RETC);
CHANGE FIELD(#L4W_CMP1) TO('#L4W_FC1 * #L4W_FC2');
CHANGE FIELD(#L4W_CMP2) TO('#L4W_FC1 / #L4W_FC2');
LEAVE IF('#L4W_RETC *NE OK');
LEAVE IF('#L4W_CMP1 *NE #L4W_RSL1');
LEAVE IF('#L4W_CMP2 *NE #L4W_RSL2');
CHANGE FIELD(#L4W_FC1) TO('#L4W_FC1 + 1');
CHANGE FIELD(#L4W_FC2) TO('#L4W_FC2 - 1');
END_LOOP;
IF COND('#L4W_COUNT *LT #L4W_TEST');
MESSAGE MSGTXT('Test ***FAILED**');
```
ELSE;
MESSAGE MSGTXT('Test completed normally');
ENDIF;
END_LOOP;

**********;

† 1. Deploy LANSA Applications to a Linux Server
1.5.3 L4WEX52 Exchange Example: Server Portion

Refer to 1.3 Test with the Verification and Sample Applications for details on using the following code example.

FUNCTION OPTIONS(*HEAVYUSAGE *DIRECT);

**********;
DEFINE FIELD(#L4W_FC1) TYPE(*DEC) LENGTH(15) DECIMALS(0);
DEFINE FIELD(#L4W_FC2) TYPE(*DEC) LENGTH(15) DECIMALS(0);
DEFINE FIELD(#L4W_RSL1) TYPE(*DEC) LENGTH(15) DECIMALS(5);
DEFINE FIELD(#L4W_RSL2) TYPE(*DEC) LENGTH(15) DECIMALS(5);
**********;
CHANGE FIELD(#L4W_RSL1) TO('#L4W_FC1 * #L4W_FC2');
CHANGE FIELD(#L4W_RSL2) TO('#L4W_FC1 / #L4W_FC2');
 **********;
EXCHANGE FIELDS(#L4W_RSL1 #L4W_RSL2);
RETURN;
 **********;

1. Deploy LANSA Applications to a Linux Server
1.5.4 L4WEX03 List Example: Client Portion

Refer to 1.3 Test with the Verification and Sample Applications for details on using the following code example.

FUNCTION OPTIONS(*DIRECT);

**********;
DEFINE FIELD(#L4W_TEST) TYPE(*DEC) LENGTH(7) DECIMALS(0) LABEL('Number of Tests') EDIT_CODE(4) DEFAULT(50);
DEFINE FIELD(#L4W_LIST) TYPE(*DEC) LENGTH(7) DECIMALS(0) LABEL('Entries in Lists') EDIT_CODE(4) DEFAULT(50);
DEFINE FIELD(#L4W_COUNT) TYPE(*DEC) LENGTH(7) DECIMALS(0);
DEFINE FIELD(#L4W_LISTC) TYPE(*DEC) LENGTH(7) DECIMALS(0);
DEFINE FIELD(#L4W_FC1) TYPE(*DEC) LENGTH(15) DECIMALS(0);
DEFINE FIELD(#L4W_FC2) TYPE(*DEC) LENGTH(15) DECIMALS(0);
DEFINE FIELD(#L4W_RSL1) TYPE(*DEC) LENGTH(15) DECIMALS(5);
DEFINE FIELD(#L4W_RSL2) TYPE(*DEC) LENGTH(15) DECIMALS(5);
DEFINE FIELD(#L4W_CMP1) TYPE(*DEC) LENGTH(15) DECIMALS(5);
DEFINE FIELD(#L4W_CMP2) TYPE(*DEC) LENGTH(15) DECIMALS(5);
DEFINE FIELD(#L4W_RETC) TYPE(*CHAR) LENGTH(2);
DEF_LIST NAME(#L4W_LIST1) FIELDS(#L4W_FC1 #L4W_FC2 #L4W_RSL1 #L4W_RSL2 TYPE(*WORKING) ENTRIES(100);
DEF_LIST NAME(#L4W_LIST2) FIELDS(#L4W_FC2 #L4W_FC1 #L4W_RSL1 #L4W_RSL2 TYPE(*WORKING) ENTRIES(100);
DEF_LIST NAME(#L4W_LIST3) FIELDS(#L4W_RSL1 #L4W_FC2 #L4W_FC1 #L4W_RSL2 TYPE(*WORKING) ENTRIES(100);
DEF_LIST NAME(#L4W_LIST4) FIELDS(#L4W_FC1 #L4W_RSL2 #L4W_RSL1 #L4W_FC2 TYPE(*WORKING) ENTRIES(100);
DEF_LIST NAME(#L4W_LIST5) FIELDS(#L4W_RSL1 #L4W_RSL2 #L4W_FC1 #L4W_FC2 TYPE(*WORKING) ENTRIES(100);
DEF_LIST NAME(#L4W_LISTC) FIELDS(#L4W_FC1 #L4W_FC2 #L4W_RSL1 #L4W_RSL2 TYPE(*WORKING) ENTRIES(100)

BEGIN_LOOP;
POP_UP FIELDS((#L4W_TEST *IN) (#L4W_LIST *IN)) DESIGN(*DOWN BEGINCHECK;
RANGECHECK FIELD(#L4W_TEST) RANGE((1 100000)) MSGTXT('Number of test must be in range 1 to 100000');
RANGECHECK FIELD(#L4W_LIST) RANGE((1 100)) MSGTXT('Entries in list must be in range 1 to 100');
ENDCHECK;

**********;

**********;
BEGIN_LOOP USING(#L4W_COUNT) TO(#L4W_TEST);
CLR_LIST NAMED(#L4W_LIST1);
CLR_LIST NAMED(#L4W_LIST2);
CLR_LIST NAMED(#L4W_LIST3);
CLR_LIST NAMED(#L4W_LIST4);
CLR_LIST NAMED(#L4W_LIST5);

**********;
CHANGE FIELD(#L4W_RSL1 #L4W_RSL2) TO(0);
CHANGE FIELD(#L4W_FC1) TO(1);
CHANGE FIELD(#L4W_FC2) TO(#L4W_LIST);
BEGIN_LOOP TO(#L4W_LIST);
ADD_ENTRY TO_LIST(#L4W_LIST1);
ADD_ENTRY TO_LIST(#L4W_LIST2);
ADD_ENTRY TO_LIST(#L4W_LIST3);
ADD_ENTRY TO_LIST(#L4W_LIST4);
ADD_ENTRY TO_LIST(#L4W_LIST5);
CHANGE FIELD(#L4W_FC1) TO('#L4W_FC1 + 1');
CHANGE FIELD(#L4W_FC2) TO('#L4W_FC2 - 1');
END_LOOP;
USE BUILTIN(CALL_SERVER_FUNCTION) WITH_ARGS(SERVER L4W)
LEAVE IF('#L4W_RETC *NE OK');
**********;
CHANGE FIELD(#L4W_LISTC) TO(0);
SELECTLIST NAMED(#L4W_LIST1);
CHANGE FIELD(#L4W_CMP1) TO('#L4W_FC1 * #L4W_FC2');
CHANGE FIELD(#L4W_CMP2) TO('#L4W_FC1 / #L4W_FC2');
LEAVE IF('(#L4W_CMP1 *NE #L4W_RSL1) *OR (#L4W_CMP2 *NE #L4W_RSL2)');
CHANGE FIELD(#L4W_LISTC) TO('#L4W_LISTC + 1');
ENDSELECT;
LEAVE IF('#L4W_LISTC *NE #L4W_LIST');
**********;
CHANGE FIELD(#L4W_LISTC) TO(0);
SELECTLIST NAMED(#L4W_LIST2);
CHANGE FIELD(#L4W_CMP1) TO('#L4W_FC1 * #L4W_FC2');
CHANGE FIELD(#L4W_CMP2) TO('#L4W_FC1 / #L4W_FC2');
LEAVE IF('(#L4W_CMP1 *NE #L4W_RSL1) *OR (#L4W_CMP2 *NE #L4W_RSL2)');
CHANGE FIELD(#L4W_LISTC) TO('#L4W_LISTC + 1');
ENDSELECT;
LEAVE IF('#L4W_LISTC *NE #L4W_LIST');
**********;
CHANGE FIELD(#L4W_LISTC) TO(0);
SELECTLIST NAMED(#L4W_LIST3);
CHANGE FIELD(#L4W_CMP1) TO('#L4W_FC1 * #L4W_FC2');
CHANGE FIELD(#L4W_CMP2) TO('#L4W_FC1 / #L4W_FC2');
LEAVE IF('(#L4W_CMP1 *NE #L4W_RSL1) *OR (#L4W_CMP2 *NE #L4W_RSL2)');
CHANGE FIELD(#L4W_LISTC) TO('#L4W_LISTC + 1');
ENDSELECT;
LEAVE IF('#L4W_LISTC *NE #L4W_LIST');
************;
CHANGE FIELD(#L4W_LISTC) TO(0);
SELECTLIST NAMED(#L4W_LIST4);
CHANGE FIELD(#L4W_CMP1) TO('#L4W_FC1 * #L4W_FC2');
CHANGE FIELD(#L4W_CMP2) TO('#L4W_FC1 / #L4W_FC2');
LEAVE IF('(#L4W_CMP1 *NE #L4W_RSL1) *OR (#L4W_CMP2 *NE #L4W_RSL2)');
CHANGE FIELD(#L4W_LISTC) TO('#L4W_LISTC + 1');
ENDSELECT;
LEAVE IF('#L4W_LISTC *NE #L4W_LIST');
************;
CHANGE FIELD(#L4W_LISTC) TO(0);
SELECTLIST NAMED(#L4W_LIST5);
CHANGE FIELD(#L4W_CMP1) TO('#L4W_FC1 * #L4W_FC2');
CHANGE FIELD(#L4W_CMP2) TO('#L4W_FC1 / #L4W_FC2');
LEAVE IF('(#L4W_CMP1 *NE #L4W_RSL1) *OR (#L4W_CMP2 *NE #L4W_RSL2)');
CHANGE FIELD(#L4W_LISTC) TO('#L4W_LISTC + 1');
ENDSELECT;
LEAVE IF('#L4W_LISTC *NE #L4W_LIST');
************;
END_LOOP;
IF COND('#L4W_COUNT *LT #L4W_TEST');
MESSAGE MSGTXT('Test ***FAILED**');
ELSE;
MESSAGE MSGTXT('Test completed normally');
ENDIF;
END_LOOP;
************;

1. Deploy LANSA Applications to a Linux Server
1.5.5 L4WEX53 List Example: Server Portion

Refer to 1.3 Test with the Verification and Sample Applications for details on using the following code example.

FUNCTION OPTIONS(*HEAVYUSAGE *DIRECT) RCV_LIST(#L4W_LIST1

**********;

DEFINE FIELD(#L4W_FC1) TYPE(*DEC) LENGTH(15) DECIMALS(0);
DEFINE FIELD(#L4W_FC2) TYPE(*DEC) LENGTH(15) DECIMALS(0);
DEFINE FIELD(#L4W_RSL1) TYPE(*DEC) LENGTH(15) DECIMALS(5);
DEFINE FIELD(#L4W_RSL2) TYPE(*DEC) LENGTH(15) DECIMALS(5);
DEF_LIST NAME(#L4W_LIST1) FIELDS(#L4W_FC1 #L4W_FC2 #L4W_RSL1 #L4W_RSL2);
DEF_LIST NAME(#L4W_LIST2) FIELDS(#L4W_FC2 #L4W_FC1 #L4W_RSL1 #L4W_RSL2);
DEF_LIST NAME(#L4W_LIST3) FIELDS(#L4W_RSL1 #L4W_FC2 #L4W_FC1 #L4W_RSL2);
DEF_LIST NAME(#L4W_LIST4) FIELDS(#L4W_FC1 #L4W_RSL2 #L4W_RSL1 #L4W_FC2);
DEF_LIST NAME(#L4W_LIST5) FIELDS(#L4W_RSL1 #L4W_RSL2 #L4W_FC1 #L4W_FC2);

**********;

SELECTLIST NAMED(#L4W_LIST1);
CHANGE FIELD(#L4W_RSL1) TO('#L4W_FC1 * #L4W_FC2');
CHANGE FIELD(#L4W_RSL2) TO('#L4W_FC1 / #L4W_FC2');
UPD_ENTRY IN_LIST(#L4W_LIST1);
ENDSELECT;

**********;

SELECTLIST NAMED(#L4W_LIST2);
CHANGE FIELD(#L4W_RSL1) TO('#L4W_FC1 * #L4W_FC2');
CHANGE FIELD(#L4W_RSL2) TO('#L4W_FC1 / #L4W_FC2');
UPD_ENTRY IN_LIST(#L4W_LIST2);
ENDSELECT;

**********;

SELECTLIST NAMED(#L4W_LIST3);
CHANGE FIELD(#L4W_RSL1) TO('#L4W_FC1 * #L4W_FC2');
CHANGE FIELD(#L4W_RSL2) TO('#L4W_FC1 / #L4W_FC2');
UPD_ENTRY IN_LIST(#L4W_LIST3);
ENDSELECT;

**********;

SELECTLIST NAMED(#L4W_LIST4);
CHANGE FIELD(#L4W_RSL1) TO('#L4W_FC1 * #L4W_FC2');
CHANGE FIELD(#L4W_RSL2) TO('#L4W_FC1 / #L4W_FC2');
UPD_ENTRY IN_LIST(#L4W_LIST4);
ENDSELECT;
**********
SELECTLIST NAMED(#L4W_LIST5);
CHANGE FIELD(#L4W_RSL1) TO('#L4W_FC1 * #L4W_FC2');
CHANGE FIELD(#L4W_RSL2) TO('#L4W_FC1 / #L4W_FC2');
UPD_ENTRY IN_LIST(#L4W_LIST5);
ENDSELECT;
**********
RETURN;

↑ 1. Deploy LANSA Applications to a Linux Server
2. Execute Applications with a Linux Server

Once your client and server are communicating, you have verified that Icolist is running on your server, and the required objects have been successfully deployed to the Server, you are ready to test execution.

- When you are first experimenting with using a Linux Server, we recommend using the sample L4WEX01 function to connect to the server to begin with. (Please refer to Testing with the Verification and Sample Applications for further information.) Later you can write your own connection function, and perhaps automatically call it via the INIT= argument. (See the INIT= and TERM= Parameters in the Technical Reference Guide for more information.)

- When you start executing applications, you will probably use the LANSA owner as your login for testing. However, you will eventually need to allow test or production users access to your application. Users must be able to read, execute, create, or update certain files and directories for successful application execution. Please carefully read Allow Users Access to LANSA in the Installing LANSA on Linux guide.

- You may need to setup some X_RUN arguments as standard. You may use the $X_RUN environment variable, or an x_lansa.pro profile to set these up. Please refer to Set up default X_RUN parameters in the Installing LANSA on Linux Guide for more details.

- Client sessions may need to set specific X_RUN arguments for connection to a Linux server. Refer to 2.1 Override X_RUN arguments inherited from the Client for details.

- You will need to execute X_RUN from the command line to check your license status, and possibly to execute batch jobs. Refer to 2.2 Start X_RUN from the command line for details.

- Full details of all the X_RUN arguments can be found in The X_RUN Parameters in the Technical Reference Guide.

You can refer to Troubleshooting for further assistance.

Further Information

2.1 Override X_RUN arguments inherited from the Client
2.2 Start X_RUN from the command line
↑ 2. Execute Applications with a Linux Server
2.1 Override X_RUN arguments inherited from the Client

Several standard X_RUN arguments are automatically inherited by the Server. (See DEFINE_OTHER_SERVER and The PSXX= Parameter in the Technical Reference Guide for details.) In most cases, these arguments are not appropriate for a Linux connection. Some recommendations for overrides are:

- Override the printer name with PRTR= (and optionally PPTH=) if any RPCs will print.
- Override DBID= and DBII=. For example, if DBID=*NONE is passed over by default, the Linux Server will not be able to access the database.
- Override DBUS= and PSWD= if they do not match your local database.
- Use the special override value *SERVER to use server defaults rather than client settings. Refer to 2.1.1 Override value *SERVER.
- If you wish to use separate temporary files (or printer files when PRTR=*PATH) into different directories for different users (for example), override TPTH= (or PPTH=) to a specific full path that is generated at connection time. You could use the system variables *USER and *PATHDELIM to generate TPTH=/home/user1/. (Keep in mind that the Linux file system is case-sensitive.)

For further details on the X_RUN parameters, please refer to The X_RUN Parameter Summary in the Technical Reference Guide.
2.1.1 Override value *SERVER

You may specify the special value *SERVER when you want to override the PC default with the Linux Server's default. This will allow you to utilize the standard Linux defaults or specific defaults that you have set up. Please refer to Set up default X_RUN parameters in the Installing LANSA on Linux Guide for more details.

For example, instead of overriding with

\[
\text{DBID=tst1 DBII=tst1 INIT=lnxinitf}
\]

you could replace this with

\[
\text{DBID=*SERVER DBII=*SERVER INIT=*SERVER}
\]

(DBID=tst1 and INIT=lnxinitf would have to be set in x_lansa.pro or $X_RUN.)

↑ 2.1 Override X_RUN arguments inherited from the Client
2.2 Start X_RUN from the command line

As LANSAn does not support an interactive user interface on Linux, only batch jobs can be started from the command line. The X_RUN argument MODE defaults to B (batch) and cannot be changed.

Any user that will be executing X_RUN from the command line will need to have their environment configured correctly. Refer to Allow Users Access to LANSAn in the Installing LANSAn on Linux Guide for details.

Please refer to Batch Jobs in the Technical Reference Guide for further details of the differences between batch jobs on Windows and Linux.

↑ 2. Execute Applications with a Linux Server
3. Troubleshooting

Please refer to the appropriate section:

- 3.1 Install or Upgrade
- 3.2 Deliver To
- 3.3 Character translation/conversion issues
- 3.4 X_RUN or submitted jobs
- 3.5 Connecting to a Linux Server
- 3.5.1 Database

Need more help?

If you cannot resolve a problem using the advice in this section, please complete the following:

1. As the LANSA owner, execute the script support.sh (located in $LANSAXROOT/x_lansa/bin, which should be in the PATH) to create the file support.txt in the current directory.

2. Contact your LANSA supplier for support and attach the support.txt file.
3.1 Install or Upgrade

Any error messages or warnings during execution of vlinstall.py will be logged to stdout.

The most common install problems are usually database issues.

Oracle SQL errors usually appear as:

- ORA-99999: message

Note: The following messages are expected (and can be ignored) for upgrades or reinstalls:

- ORA-01921: role name XXXX conflicts with another user or role name
- ORA-01920: user name XXXXX conflicts with another user or role name

RUNSQL (table creation errors) appear as:

- RUNSQL ended in error. Return code is -1652.

If you have database issues, please refer to 3.5.1 Database.

It is safe to re-run the install after you have resolved the issues that caused problems.

↑ 3. Troubleshooting
3.2 Deliver To

Any error messages or warnings during server-side execution of Deliver To will be logged to a job log, which can be retrieved by clicking on the magnifying glass against the message.

- If you have issues connecting to the server, please refer to 3.5 Connecting to a Linux Server.
- If you have database issues, please refer to 3.5.1 Database.
- If you have other issues, please refer to 3.4 X_RUN or submitted jobs.

Note that default X_RUN parameters will also be used by Deliver To. Please refer to Set up default X_RUN parameters in the Installing LANSA on Linux Guide to determine where default parameters may be set up.

↑ 3. Troubleshooting
3.3 Character translation/conversion issues

A locale includes location-specific information such as date and time format, currency symbol, range of characters supported, and so on. LANSA uses the setlocale() and nl_langinfo() APIs to retrieve information about your site's locale. LANSA assumes that the locale environment variables are set correctly for your location. For example, when you install Red Hat Enterprise Linux, and choose an Australian timezone, none of the LC_* variables are set, and LANG is set to en_AU.UTF-8. Refer to your operating system manuals on the setlocale() and nl_langinfo APIs for further information.

↑ 3. Troubleshooting
3.4 X_RUN or submitted jobs

Where can I find logs of messages and errors?

- LANSAna Fatal errors are logged to a LANSAna file called x_err.log and also to the system log. The x_err.log file contains the exact X_RUN parameter list used (including defaults from x_lansa.pro and the $X_RUN environment variable). The x_err.log is located in the $LANSAXROOT/x_lansa/log by default.

- LANSAna messages are logged to standard error (in the case of X_RUN executed from the command line) and the system log.

Refer to Batch Jobs in the Deploying Visual LANSAna Applications Guide for details on capturing standard error output and accessing the system log.

- LANSAna Communications errors are logged to $LANSAXROOT/log/lroute.trc by default. Refer to Linux Configuration in the LANSAna Communications Setup Guide for other possible locations.

- If no log files are being created, and you are not logged in to the Linux Server as the LANSAna owner, file and directory permissions may be causing you problems. Try again, using the LANSAna owner as the login, and refer to Allow Users Access to LANSAna in the Installing LANSAna on Linux Guide.

Where can I find out what SQL error -1017 means?

SQL error -1017 means invalid user id or password when connecting to an ORACLE database.

Refer to 3.5.1 Database for help on resolving other SQL errors.

Where can I find out how my default X_RUN parameters are being set?

Refer to Setting up default X_RUN parameters in the Installing LANSAna on Linux Guide.

提起 3. Troubleshooting
3.5 Connecting to a Linux Server

Refer to this checklist for help with problems connecting to the Linux Server.

Also see

| 3.5.1 Database | 3.5.2 Connection | 3.5.3 Diagnosing ORACLE / SQL run-time errors |

Server Problem Check List

<table>
<thead>
<tr>
<th>Check to be Performed</th>
<th>Comments / Further Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process lclist shows as two active processes when the active processes are displayed (normal operation).</td>
<td>You can use `ps -ef</td>
</tr>
<tr>
<td>O/S user profile and password coming from the client are valid on the server system and in the correct case (if applicable).</td>
<td></td>
</tr>
<tr>
<td>DBMS user profile and password coming from the client are valid on the server system.</td>
<td></td>
</tr>
<tr>
<td>Process lcotp shows up as an active process</td>
<td>If this is not true, you have an initial connection problem or an application start up problem. If there is no entry in the x_err.log file, try turning on tracing of</td>
</tr>
<tr>
<td>Description</td>
<td>Possible Cause and Solution</td>
</tr>
<tr>
<td>-------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>After connection is made. Each connection has its own lcotp running. You can use `ps -ef</td>
<td>grep lcotp` to check.</td>
</tr>
<tr>
<td>Process lcotp starts when a connection is made but it quickly fails (or disappears) and the client gets a communications error.</td>
<td>You have an initial X_RUN environment problem such as DBMS connection problem or a failure in your own application. Look in the <code>x_err.log</code> file on the server system. Refer to <strong>Where can I find logs of messages and errors?</strong> for the file location.</td>
</tr>
<tr>
<td>Process lcotp fails (or disappears) while your application is running and the client gets a communications error.</td>
<td>Look in the <code>x_err.log</code> file on the server system. Refer to <strong>Where can I find logs of messages and errors?</strong> for the file location.</td>
</tr>
<tr>
<td><code>x_err.log</code> shows an SQL error</td>
<td>Refer to <em>Database</em> following for help.</td>
</tr>
</tbody>
</table>
3.5.1 Database

For problems connecting to an ORACLE database, refer to 3.5.2 Connection. For help diagnosing other ORACLE problems, refer to *Diagnosing ORACLE / SQL run-time errors* following.

**Note:** If you have ORACLE database issues that you cannot resolve, please contact ORACLE support for assistance before contacting your LANSA supplier.
3.5.2 Connection

The most common cause of connection problems are:

- The database user id or password is wrong. This can usually be diagnosed by looking in the x_err.log where the X_RUN parameters are listed.
- The ORACLE listener or database is not started. To check whether the listener is started use the following command on the database server
  
  lsnrctl status

To see whether the database is started use the following command on the database server

  ps -ef | grep $ORACLE_SID

- The ORACLE listener is not configured correctly. Refer to Oracle support and manuals for possible causes.
3.5.3 Diagnosing ORACLE / SQL run-time errors

You can diagnose run-time SQL errors by looking up the ORACLE message for a given number. For example, if you get SQL error code 942, you can look up ORA-00942 to see that the table does not exist (or the user does not have any privileges to see the table).

A standard ORACLE server installation includes the utility oerr. To look up SQL error -942, use the following command:

```
oerr ORA 942
```

The ORACLE guides may provide more information than the oerr utility.

↑ 3. Troubleshooting