

PowerCLTM

Control Language for Files (CLF) Installation Reference

Bruce Vining Services, LLC.

*Integrated Solutions for the
i user community*

2253 5th Ave NE
Rochester, MN 55906
Phone 507/206-4178
www.brucevining.com

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CLF04-01-00

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- The CLF Programmer's Guide for CL Developers
- The CLF Programmer's Guide for RPG Developers
- The CLF Installation Reference
- The CLF Run-Time Generation Tools Guide
- The product brochure
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IBM i5/OS
System i

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1. Welcome to Control Language for Files

The IBM i Control Language (CL) is a very powerful and productive language that virtually all programmers and operators of the system are familiar with. It allows you to run your system, write application programs to automate system operations, and write application programs work with the products you may have installed on your system. CL however does have limitations in terms of its ability to work with the business databases that run your company and its ability to provide information to users in the form of interactive applications and printed reports.

The PowerCL Control Language for Files (CLF) product addresses these limitations and does so in a manner that maximizes the productivity of your operators and programmers. CLF supports the use of System i files directly from CL applications. With a rich set of CL commands CLF allows your CL developers to directly work with file types such as database, display, and printer. System operators and application developers can experience significant productivity enhancements as they no longer need to work with multiple languages in order to use the flexibility of CL and the database support of high level languages such as RPG, COBOL, and C. CLF provides a superset of the file support found in these other high level languages, and this superset is accessible entirely through CLF provided command interfaces. CLF provides a common, consistent interface to your System i resources.

SUMMARY OF FEATURES

- Supports physical files, logical files, DDM files, Open query files, and SQL views
 - Externally described data in addition to program described
 - Keyed access and access by relative record number
 - Read, Write, Update, and Delete
 - Dynamic changes in sequential read direction
 - Commit and Rollback support
 - Support for null fields, variable-length fields, extended data types, reuse of deleted records
 - Logical files can be single format, multi-format, or join
- Supports display files

- Externally described data in addition to program described
- Subfiles
- Read, Write, and Write/Read support
- Multiple device support
- Supports printer files
 - Externally described data in addition to program described
 - Override of spool file name, user data
- Two command interfaces provided
 - Traditional CL syntax such as:
 - OPNFCLF to Open a File using CLF
 - POSDBFCLF to Position a File using CLF
 - Free-form RPG-like syntax such as:
 - OPEN to Open a File using CLF
 - SETLL to Position a File using CLF
 - Can intermix the two syntax styles to maximize development productivity
- Extensive on-line help for commands and menus
- CLF file commands can co-exist with traditional CL file commands
 - Add CLF function to existing CL applications with minimal effort
 - Greater productivity by not having to use the OPNID of traditional CL DCLF support when using more than one file in the CL application program
- Elimination of need to write RPG/COBOL/C programs to meet input/output needs of CL application
 - Less programs to develop/test/maintain

- Easier application development by staying in one application language environment. If 95% of the function is best served by traditional CL why introduce RPG, COBOL, or C for the remaining 5%?
- Supports both Integrated Language Environment (ILE) and Original Program Model (OPM) CL program environments
- Sample databases and complete application examples provided
- Capability of writing non-trivial input/output applications entirely in CL
- National language enabled and will operate correctly with any System i supported national language version (NLV)
- Supports up to 1000 concurrently open files per activation group, over 32000 concurrently open files per job

2. About This Manual

This Installation Reference provides information related to:

- The functions provided by CLF product options
- Downloading the CLF product to either your workstation or your Power i system
- Restoring one or more options of the CLF product
- Enabling one or more options of the CLF product through license keys
- Verifying the installation of the CLF product
- Installing CLF product upgrades
- Maintaining CLF product options through the periodic application of PTFs
- CLF product support

For information related to the use of the CLF product refer to the CLF Programmer's Guide for CL Developers, The CLF Programmer's Guide for RPG Developers, or the CLF Run-Time Generation Tools Guide.

Your feedback on CLF and this manual is important in helping to provide the most accurate and high-quality information. Bruce Vining Services welcomes any comments about this manual or other Bruce Vining Services documentation.

If you prefer to send comments by mail, use the following address:

Bruce Vining Services
Attn: Information Development
2253 5th Ave NE
Rochester, MN 55906

If you prefer to send comments electronically, please go to our web site at www.brucevining.com and select 'Contact Us'.

Be sure to include the name of the book, the version of the book (found on the front page, lower left corner) and the page number or topic that your comment applies to.

This manual is available online at www.brucevining.com. When working with a hardcopy version of this manual you will want to verify that your copy is the most recent.

3. Product Packaging, Installation, and Maintenance

PRODUCT PACKAGING

CLF is a member of the PowerCL family of products. The CLF product, 1BVSCLF, is installed using the Restore Licensed Program (RSTLICPGM) command. PTFs are applied using the Apply Program Temporary Fix (APYPTF) command. The CLF product has four options (or features) defined:

- The base run-time support
- A precompiler which provides for maximum productivity when developing CL database, interactive, and/or report generating applications
- A set of commands to generate file, field, and indicator definitions when developing CL database, interactive and/or report generating applications without the use of the precompiler
- Sample source code for CLF programs, database files, display files, and printer files

You can download a fully functional trial of CLF from the web site at brucevining.com.

CLF Base Product Option

The CLF base product provides run-time environment support for CLF applications. CLF applications can be developed on one system (using the optional precompiler support, the optional generation commands, or the base run-time support) and then distributed to other systems that have only the base run-time product installed. The base product option provides all necessary run-time support for *any* CLF application.

In addition to the run-time commands to work with files the base product also provides all of the CLF precompiler commands with the exception of the actual create commands - - CRTBNDCLF, CRTCLFPGM, CRTCLFMOD, CLFI, and CLFO. The remaining precompiler commands are packaged with the base product so that you can prompt and access the online help provided with these commands if you are performing problem determination on a production system that does not have the precompiler installed. A list of the commands provided with this option can be found in Objects created with the base option of CLF.

Though there is nothing to prevent a developer from writing an application using only the base run-time support, programmer productivity will not be high relative to using either a precompiler or the generation tools. The intent of providing the base run-time support as a separate, no charge option is to facilitate the development of applications using the precompiler, or the generation tools, and then distributing those applications to production environments where no additional fee-based software is required. It is not intended that developers create applications using only the base run-time product.

CLF Option 1: The Precompilers

Option 1 of the CLF product provides precompilers for both OPM and ILE CL application developers. The precompilers provide a rich development environment for the building of CLF applications -- an environment that can significantly improve the productivity of CL developers when working with files on the System i. The CLF precompilers greatly simplify the development effort involved when working in environments such as common field names that exist in more than one file (in particular common field names across database files, display files, and/or printer files), multi-format files, database files using fields defined as null capable or variable-length, etc. A list of the commands provided with this option can be found in Objects created with option 1 of CLF.

CLF Option 2: Run-Time Generation Tools

Option 2 of the CLF product provides support for externally described files when the precompiler (option 1) is not available to you. This option provides a level of development function that is sufficient for the creation of simple CLF applications. An example of a simple application is one where only one file is needed within the CL program. Multi-file applications can be written using only the base run-time support and the Run-time Generation Tools, but programmer productivity will not be as high when compared to using the precompiler support. A list of the commands provided with this option can be found in Objects created with option 2 of CLF. When ordering a license key for option 1 of CLF you automatically also receive a license key for option 2.

CLF Option 3: Sample Programs

Option 3 of the CLF product provides a large number of sample programs in the CLF product library VC2CLF. The source files are VC2CLSRC, QDDSSRC, and QCMSRC.

VC2CLSRC contains the source for the sample programs used in this manual and the example programs provided in the online help available with all CLF commands.

- Source members with a name starting with 'DEV_' are example programs that require the use of the precompiler of option 1 in order to be created. Once

compiled, the DEV_ programs require only the run-time base support of CLF in order to run.

- Source members with a name starting with 'RPG_' are example programs that require the use of the precompiler of option 1 and demonstrate the use of the free-form RPG-like command interface. Once compiled, the RPG_ programs require only the run-time base support of CLF in order to run.
- Source members with a name starting with 'RNT_' are example programs that utilize the run-time generation tools of option 2. These examples can be compiled using the i commands Create Bound CL Program (CRTBNDCL), Create CL Module (CRTCLMOD), or Create CL Program (CRTCLPGM). Once compiled, the 'RNT_' programs require only the run-time base support of CLF in order to run.
- Source members with a name starting with 'BAS_' are example programs that are written using only the base-runtime support. Once compiled, the BAS_ programs require only the run-time base support of CLF in order to run.

The QDDSSRC source file contains:

- DDS for the sample databases that are provided with the CLF product
- DDS for display files that are used by some of the CLF sample programs
- DDS for printer files that are used by some of the CLF sample programs

The QCMDSRC source file contains the source for commands that are related to some of the example programs found in this manual.

A list of the objects provided with this option can be found in Objects created with option 3 of CLF.

INSTALLATION

Requirements for System i

CLF can be used with any System i running i5/OS V5R4M0 or higher.

When using ILE based CLF applications you will need to make sure the following PTFs for the i operating system are applied to your system:

V5R4: SI34814 for 5722-SS1

V6R1: SI34924 for 5761-SS1

These PTFs correct a problem with the ILE CL compiler and have been available from IBM since early 2009 so it is likely that they are already on your system. It is also highly likely that the PTFs have been superceded. In this case you should consider the PTFs as being installed if the superceding PTF is installed.

Available in English, CLF is national language enabled and will operate correctly with any i5/OS supported national language version (NLV).

Downloading PowerCL: CLF from the Internet to Your PC

The following steps detail how to download the CLF product as a zip file to your Windows system and then FTP CLF to your IBM i system.

Step	Description
1	If not already at the CLF Product Downloads page start an internet browser session (such as Internet Explorer) from your PC and go to CLF Product Downloads
2	Click on the 'here' link provided with Option 1
3	Save the zip file to a directory of your choice
4	Unzip the zip file. This will extract the vc2clf.savf file in addition to PDF files associated with the CLF product
5	From Windows select Start->Run->cmd
6	Change your current directory to the directory containing the vc2clf.savf created in step 4
7	Enter the command ftp xxx.xxx.xxx.xxx where xxx.xxx.xxx.xxx is the ip address of your IBM i system
8	Sign on to your i system with a user profile authorized to work with save files (*SAVFs) and FTP client sessions

9	<p>Enter the command</p> <pre>binary</pre> <p>to change the transfer type to image</p>
10	<p>Enter the command</p> <pre>quote site namefmt 0</pre> <p>to use library naming convention</p>
11	<p>Enter the command</p> <pre>quote rcmd crtsavf file(qgpl/vc2clf)</pre> <p>to create the *SAVF VC2CLF in library QGPL. An error will occur if the *SAVF currently exists. The put command of step 12 will replace the current contents of the *SAVF so the error can be ignored (assuming you do not have a VC2CLF *SAVF independent of CLF).</p>
12	<p>Enter the command</p> <pre>put vc2clf.savf qgpl/vc2clf</pre> <p>to replace the contents of the VC2CLF *SAVF in QGPL</p>
13	<p>Enter the command</p> <pre>quit</pre> <p>to end the FTP session</p>
14	<p>Enter the command</p>

	<code>exit</code> to end your command session
15	Proceed to Introduction to Restoring PowerCL: CLF to Your Power i System

Table 3. 1- Downloading CLF to your PC

Downloading PowerCL: CLF from the Internet to Your IBM i System

The following steps detail how to directly FTP the CLF product to your IBM i system.

Step	Description
1	Sign on to your system with a user profile authorized to work with save files (*SAVFs) and FTP client sessions. If you will also be doing the restore of CLF on your system then sign on as the security officer (or any other user profile capable of running the Restore Licensed Program (RSTLICPGM) command. The special authorities necessary to run this command are *SECADM and *ALLOBJ.)
2	If you are not already on the Command Entry screen go there using the command CALL QCMD
3	Ensure that the save file (*SAVF) VC2CLF in library QGPL is available for receiving the downloaded CLF *SAVF. From the command line enter the command DSPSAVF FILE(QGPL/VC2CLF) If you receive an error message such as CPF9812 (File VC2CLF in library QGPL not found) then create the save file with the command CRTSAVF FILE(QGPL/VC2CLF) If you did not receive an error message when running the previous DSPSAVF command then clear the existing save file with the command CLRSAVF FILE(QGPL/VC2CLF)
4	FTP the CLF *SAVF to your system. From the command line enter either the command

	<pre>FTP RMTSYS ('67.15.211.12')</pre> <p>or</p> <pre>FTP RMTSYS (POWERCL.COM)</pre> <p>Note that in the following directions all text entered by you is <i>case sensitive</i> and should be entered in lowercase.</p> <p>When prompted with a message such as 'Enter login ID' enter</p> <pre>clf@powercl.com</pre> <p>When prompted with a message such as 'Enter password:' enter</p> <pre>powercl</pre> <p>When prompted with a message such as 'Enter an FTP subcommand' enter the following commands:</p> <pre>binary namefmt 0 get vc2clf.savf ggpl/vc2clf (replace quit</pre>
5	Proceed to Introduction to Restoring PowerCL: CLF to Your Power i System

Table 3. 2 - Downloading CLF to your i system

Introduction to Restoring PowerCL: CLF to Your Power i System

CLF makes use of the software license agreement and software license key support that is provided with the i operating system.

The software agreement contains important information concerning the use and management of the CLF product. Bruce Vining Services licenses software to you, either as an individual or an entity, through these software agreements. Before you can successfully install and use CLF you must accept the online software agreement for the product. The CLF software agreement can be displayed or printed through the Work with Software Agreements (WRKSWAGR) command. You will be prompted to accept the software agreement during the restore process of the CLF product (if you have not previously accepted the agreement).

Bruce Vining Services provides a 30-day trial period for the fee-based options of CLF (options 1 and 2). During that time you can try the product option without a license key. After the 30-day trial period however you must load a license key to continue to use the product. The 30-day period starts from the day of the first use of the CLF option. There are separate license keys for the precompiler (option 1) and the run-time development tools (option 2). When ordering a license key for the precompiler Bruce Vining Services will automatically include a license key for the run-time generation tools at no additional charge. The base run-time (base option) and sample programs (option 4) do not require a license key.

CLF Restore Instructions

Step	Description
1	Sign on to your system as the security officer (or any other user profile capable of running the Restore Licensed Program (RSTLICPGM) command. The special authorities necessary to run this command are *SECADM and *ALLOBJ.)
2	If you are not already on the Command Entry screen go there using the command CALL QCMD
3	Restore the CLF product option save files (*SAVFs) from the CLF *SAVF you stored in library QGPL with the following command: RSTOBJ OBJ (*ALL) SAVLIB (QTEMP) DEV (*SAVF) SAVF (QGPL/VC2CLF)

4

The base option of CLF must be installed prior to the installation of any other options of the CLF product. Restore the base option of CLF using the command

```
RSTLICPGM LICPGM(1BVSCLF) DEV(*SAVF) SAVF(VC2CLFBASE)
```

As part of the RSTLICPGM process you may be shown the Software Agreement for the base product of CLF. Review the software agreement and use command key 14 to accept the agreement.

You can decline the agreement with command key 16. The product option will not be restored if you decline the software agreement.

During the install process you may see the message CPF9E58 - License key information not found. This is a normal condition if you have not previously used CLF on your system.

If the user profile CLF_OWNER does not exist on your system the restore process will create a user profile by that name. The profile will be created with the following attributes:

- password of *NONE
- limited capabilities set to *YES
- special authorities of *NONE
- initial menu of *SIGNOFF
- status of *DISABLED
- text of 'Bruce Vining Services CLF owning profile'

The CLF_OWNER user profile owns all of the permanent objects provided with the CLF product. A list of the objects created can be found in Appendix A. Objects Created by CLF

If the CLF_OWNER user profile exists on your system prior to restoring the CLF product then CLF will use your existing profile. If any attribute differences between your pre-existing CLF_OWNER profile and the profile CLF would have created are detected, they will be identified through messages sent to your job log. These differences however will be left as is. The CLF restore process will not alter any user profile customizations you may have done in the past.

The next step in the install process depends on what, if any, additional options of CLF you are installing.

	<p>If you are installing the precompiler continue to Step 5.</p> <p>If you are not installing the precompiler but are installing the run-time generation tools go to Step 6.</p> <p>If you are not installing the precompiler or the run-time generation tools but are installing the sample programs continue to Step 7.</p> <p>If you are not installing any additional options of the CLF product continue to Step 11.</p>
5	<p>Restore option 1 of CLF using the command</p> <pre>RSTLICPGM LICPGM(1BVSCLF) DEV(*SAVF) OPTION(1) + SAVF(VC2CLF0001)</pre> <p>Note that you cannot install option 1 of CLF without previously installing the base CLF product option.</p> <p>As part of the RSTLICPGM process you may be shown the Software Agreement for option 1 (the precompiler) of CLF. Review the software agreement and use command key 14 to accept the agreement.</p> <p>You can decline the agreement with command key 16. The product option will not be restored if you decline the software agreement.</p> <p>During the install process you may see the message CPF9E58 - License key information not found. This is a normal condition if you have not previously used CLF on your system. License key information is not necessary in order to use CLF during the 30-day trial period. License key information will be provided to you when you order the CLF product.</p> <p>The next step in the install process depends on what, if any, additional options of CLF you are installing.</p> <p>If you are installing the run-time generation tools go to Step 6.</p> <p>If you are not installing the run-time generation tools but are installing the sample programs continue to Step 7.</p> <p>If you are not installing any additional options of the CLF product continue to Step 8.</p>
6	<p>Restore option 2 of CLF using the command</p> <pre>RSTLICPGM LICPGM(1BVSCLF) DEV(*SAVF) OPTION(2) +</pre>

	<p style="text-align: center;">SAVE (VC2CLF0002)</p> <p>Note that you cannot install option 2 of CLF without previously installing the base CLF product option.</p> <p>As part of the RSTLICPGM process you may be shown the Software Agreement for option 2 (the run-time generation tools) of CLF. Review the software agreement and use command key 14 to accept the agreement.</p> <p>You can decline the agreement with command key 16. The product option will not be restored if you decline the software agreement.</p> <p>During the install process you may see the message CPF9E58 - License key information not found. This is a normal condition if you have not previously used CLF on your system. License key information is not necessary in order to use CLF during the 30-day trial period. License key information will be provided to you when you order the CLF product.</p> <p>The next step in the install process depends on what, if any, additional options of CLF you are installing.</p> <p>If you are installing the sample programs continue to Step 7.</p> <p>If you are not installing any additional options of the CLF product continue to Step 8.</p>
7	<p>Restore option 3 of CLF using the command</p> <pre>RSTLICPGM LICPGM(1BVSCLF) DEV(*SAVE) OPTION(3) + SAVE (VC2CLF0003)</pre> <p>Note that you cannot install option 3 of CLF without previously installing the base CLF product option.</p> <p>As part of the RSTLICPGM process you may be shown the Software Agreement for option 3 (CLF sample programs) of CLF. Review the software agreement and use command key 14 to accept the agreement.</p> <p>You can decline the agreement with command key 16. The product option will not be restored if you decline the software agreement.</p> <p>During the install process you may see the message CPF9E58 - License key information not found. This is a normal condition if you have not previously used CLF on your system.</p>
8	<p>If you received license keys for the CLF product continue to Step 9. If you do not have</p>

	<p>license keys to install then you have completed all required steps.</p> <p>If you have installed option 3, CLF Sample Programs, you can optionally verify the correct installation of CLF. To verify your installation of the CLF product go to Step 11.</p> <p>If you have not installed option 3, or you do not want to verify the installation of CLF, you can proceed to the Chapter 4. Creating and Running a CLF Application of the appropriate CLF Programmer’s Guide to to start using the CLF product.</p>
9	<p>If you have the license key for option 1 of CLF install the key using the Add License Key Information (ADDLICENSE) command</p> <pre>ADDLICENSE PRDID(1BVSCLF) LICTRM(V1) FEATURE(5002) + LICENSE(XXXXXX XXXXXX XXXXXX) USGLMT(*NOMAX) VNDDTA(YYY)</pre> <p>where you replace the ‘XXXXXX XXXXXX XXXXXX’ values of the License Key (LICENSE) keyword with the license key that was provided to you by Bruce Vining Services. In the same way you replace the ‘YYY’ values of the Vendor Data (VNDDTA) keyword with the supplied vendor data.</p>
10	<p>If you have the license key for option 2 of CLF install the key using the Add License Key Information (ADDLICENSE) command</p> <pre>ADDLICENSE PRDID(1BVSCLF) LICTRM(V1) FEATURE(5003) + LICENSE(XXXXXX XXXXXX XXXXXX) USGLMT(*NOMAX) VNDDTA(YYY)</pre> <p>where you replace the ‘XXXXXX XXXXXX XXXXXX’ values of the License Key (LICENSE) keyword with the license key that was provided to you by Bruce Vining Services. In the same way you replace the ‘YYY’ values of the Vendor Data (VNDDTA) keyword with the supplied vendor data.</p>
11	<p>You have completed all necessary steps to install and use CLF. If you do not want to verify the installation of the CLF product at this time you can proceed to Chapter 4. Creating and Running a CLF Application of the appropriate CLF Programmer’s Guide to to start using the CLF product.</p> <p>To verify the installation of the CLF product you only need to perform the first of the following steps that describe the options you have installed.</p> <p>If you have installed option 1, the precompiler, go to CLF Precompiler Verification Instructions</p> <p>If you have installed option 2, the generation tools, go to CLF Run-Time Generation Tools Verification Instructions</p>

	<p>If you have installed the run-time base support go to CLF Run-time Verification Instructions.</p> <p>Otherwise you can proceed to Chapter 4. Creating and Running a CLF Application of the appropriate CLF Programmer's Guide to to start using the CLF product.</p>
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Table 3. 3 - Restoring CLF to your i system

CLF Run-time Verification Instructions

When you restored option 3 of the CLF product to your system the installation process also created two sample databases in the library VC2CLF. These database files are VC2EMP, a sample employee database, and VC2DPT, a sample department database. These files are currently empty, but are used extensively by the sample programs found in the CLF online command help and examples provided in the CLF Programmer’s Guides.

To verify the correct operation of CLF you will now compile and run a program that will load sample data into these files. The name of the program is BAS_LOAD for Base run-time Load of the sample databases.

1	<p>Verify that the VC2EMP and VC2DPT databases currently have no records by using the commands:</p> <pre>DSPPFM FILE (VC2CLF/VC2EMP) DSPPFM FILE (VC2CLF/VC2DPT)</pre> <p>If either file contains records you should remove them with the commands:</p> <pre>CLRPFM FILE (VC2CLF/VC2EMP) CLRPFM FILE (VC2CLF/VC2DPT)</pre> <p>If records do exist in the VC2CLF/VC2EMP database the BAS_LOAD program will send you several messages indicating that you need to clear the files.</p>
2	<p>Compile the BAS_LOAD program into QTEMP using either</p> <pre>CRTBDNCL PGM(QTEMP/BAS_LOAD) SRCFILE (VC2CLF/VC2CLSRC)</pre> <p>Or</p> <pre>CRTCLPGM PGM(QTEMP/BAS_LOAD) SRCFILE (VC2CLF/VC2CLSRC)</pre>
3	<p>Run the BAS_LOAD program to load records into the two sample database files. To run the program use the command</p> <pre>CALL PGM(QTEMP/BAS_LOAD)</pre>
4	<p>Verify that records have been written to the files using the commands:</p> <pre>DSPPFM FILE (VC2CLF/VC2EMP)</pre>

	<p>DSPPFM FILE (VC2CLF/VC2DPT)</p> <p>You should find 15 records in VC2CLF/VC2EMP and 5 records in VC2CLF/VC2DPT.</p> <p>For details concerning these files and records you can refer to the appendix titled VC2EMP and VC2DPT Sample Files of the appropriate CLF Programmer's Guide.</p>
5	<p>This completes the run-time verification of CLF. You can now proceed to Chapter 4. Creating and Running a CLF Application of the appropriate CLF Programmer's Guide to to start using the CLF product.</p>

Table 3. 4 - Verifying the installation of CLF Run-time Support

CLF Precompiler Verification Instructions

When you restored the CLF product to your system the installation process also created two sample databases in the library VC2CLF. These database files are VC2EMP, a sample employee database, and VC2DPT, a sample department database. These files are currently empty, but are used extensively by the sample programs found in the CLF online command help and examples provided in the CLF Programmer’s Guides.

To verify the correct operation of CLF you can now compile and run a program that will load sample data into these files. The name of the program is DEV_LOAD.

1	<p>Verify that the VC2EMP and VC2DPT databases currently have no records by using the commands:</p> <pre>DSPPFM FILE (VC2CLF/VC2EMP) DSPPFM FILE (VC2CLF/VC2DPT)</pre> <p>If either file contains records you should remove them with the commands:</p> <pre>CLRPFM FILE (VC2CLF/VC2EMP) CLRPFM FILE (VC2CLF/VC2DPT)</pre> <p>If records do exist in the VC2CLF/VC2EMP database the DEV_LOAD program will send you several messages indicating that you need to clear the files.</p>
2	<p>Compile the DEV_LOAD program into QTEMP using either</p> <pre>CRTBNDCLF PGM(QTEMP/DEV_LOAD) SRCFILE(VC2CLF/VC2CLSRC)</pre> <p>Or</p> <pre>CRTCLFPGM PGM(QTEMP/DEV_LOAD) SRCFILE(VC2CLF/VC2CLSRC)</pre> <p>Note that these are the precompiler command CRTBNDCLF and CRTCLFPGM and not the system provided CRTBNDCL and CRTCLPGM commands. The extra ‘F’ in the command name is important. As these command names are very similar to the IBM provided CL create commands CLF also provides the commands CLFI and CLFO. If you prefer you can use the CLFI command rather than CRTBNDCLF and the CLFO command rather than CRTCLFPGM.</p>
3	<p>Run the DEV_LOAD program. Running the program will load the two database files. To run the program use the commands</p>

	<pre>ADDLIBLE LIB (VC2CLF) CALL PGM (QTEMP/DEV_LOAD)</pre>
4	<p>Verify that records have been written to the files using the commands:</p> <pre>DSPPFM FILE (VC2CLF/VC2EMP) DSPPFM FILE (VC2CLF/VC2DPT)</pre> <p>You should find 15 records in VC2CLF/VC2EMP and 5 records in VC2CLF/VC2DPT</p>
5	<p>This completes the precompiler verification of CLF. You can now proceed to Chapter 4. Creating and Running a CLF Application of the appropriate CLF Programmer's Guide to start using the CLF product.</p>

Table 3. 5 - Verifying the installation of CLF Precompiler Support

CLF Run-Time Generation Tools Verification Instructions

When you restored the CLF product to your system the installation process also created two sample databases in the library VC2CLF. These database files are VC2EMP, a sample employee database, and VC2DPT, a sample department database. These files are currently empty, but are used extensively by the sample programs found in the CLF online command help and examples provided in the CLF Programmer's Guides.

To verify the correct operation of CLF you can now compile and run a program that will load sample data into these files. The name of the program is RNT_LOAD.

1	<p>Verify that the VC2EMP and VC2DPT databases currently have no records by using the commands:</p> <pre>DSPPFM FILE (VC2CLF/VC2EMP) DSPPFM FILE (VC2CLF/VC2DPT)</pre> <p>If either file contains records you should remove them with the commands:</p> <pre>CLRPFM FILE (VC2CLF/VC2EMP) CLRPFM FILE (VC2CLF/VC2DPT)</pre> <p>If records do exist in the VC2CLF/VC2EMP database the RNT_LOAD program will send you several messages indicating that you need to clear the files.</p>
2	<p>Compile the RNT_LOAD program into QTEMP using either</p> <pre>CRTBNDCL PGM(QTEMP/RNT_LOAD) SRCFILE(VC2CLF/VC2CLSRC)</pre> <p>Or</p> <pre>CRTCLPGM PGM(QTEMP/RNT_LOAD) SRCFILE(VC2CLF/VC2CLSRC)</pre>
3	<p>Run the RNT_LOAD program. Running the program will load the two database files. To run the program use the commands</p> <pre>ADDLIBLE LIB(VC2CLF) CALL PGM(QTEMP/RNT_LOAD)</pre>
4	<p>Verify that records have been written to the files using the commands:</p> <pre>DSPPFM FILE (VC2CLF/VC2EMP) DSPPFM FILE (VC2CLF/VC2DPT)</pre>

	You should find 15 records in VC2CLF/VC2EMP and 5 records in VC2CLF/VC2DPT
5	This completes the precompiler verification of CLF. You can now proceed to Chapter 4. Creating and Running a CLF Application of the appropriate CLF Programmer's Guide to start using the CLF product.

Table 3. 6 - Verifying the Installation of CLF Run-Time Generation Tools

CLF PRODUCT UPGRADES

Periodically there may be new modification levels, release levels, or version levels of the CLF product. These new levels may provide additional function and/or corrective maintenance to the CLF product. To upgrade your current software to the latest level you will use the RSTLICPGM command. You can, at your discretion, use the DLTLICPGM command prior to performing the upgrade but this is not necessary. If there are any special considerations related to the upgrade they will be documented in a Read Me First file provided with the new software upgrade.

After you have restored the upgraded *SAVF VC2CLF to the QGPL library you run the command

```
RSTOBJ OBJ(*ALL) SAVLIB(QTEMP) DEV(*SAVF) SAVF(QGPL/VC2CLF)
```

To upgrade to the latest level of CLF run-time you then use the command

```
RSTLICPGM LICPGM(1BVSCLF) DEV(*SAVF) SAVF(VC2CLFBASE)
```

To upgrade to the latest level of the CLF precompiler you then use the command

```
RSTLICPGM LICPGM(1BVSCLF) DEV(*SAVF) OPTION(1) +  
SAVF(VC2CLF0001)
```

To upgrade to the latest level of the CLF run-time generation tools you then use the command

```
RSTLICPGM LICPGM(1BVSCLF) DEV(*SAVF) OPTION(2) +  
SAVF(VC2CLF0002)
```

To upgrade to the latest level of the CLF sample programs you then use the command

```
RSTLICPGM LICPGM(1BVSCLF) DEV(*SAVF) OPTION(3) +  
SAVF(VC2CLF0003)
```

Any PTFs that may be available for the latest software level, and not integrated into the software upgrade, will be available at <http://www.brucevining.com/>

CLF PRODUCT MAINTENANCE

As with your i operating system and related licensed programs from IBM keeping your CLF software current should be an important part of your system's maintenance strategy. And just as you load and apply PTFs for IBM software, you will use the same tools to maintain the CLF product.

Bruce Vining Services provides you with fixes in the form of individual PTFs and group PTFs. These fixes can be downloaded from <http://www.brucevining.com/>. Fixes are loaded and applied to your system using the Load Program Temporary Fix (LODPTF) and Apply Program Temporary Fix (APYPTF) commands.

Fix cover letters provide information about the fix that they accompany. They explain the contents of a fix, the problem that the fix resolves, special instructions that are associated with the fix, and prerequisite or co requisite PTFs that must also be installed on your system for the fix to function correctly. You can view the cover letters using either the Display PTF Cover Letter (DSPPTFCVR) command or the Display PTF (DSPPTF) command.

CLF PRODUCT SUPPORT

The level of product support available to you depends on the options that you have installed on your system.

When you install the precompiler (option 1 of CLF) license you receive 6 months of software support. This support includes telephone and electronic access to highly-trained technical support specialists to provide fast, accurate problem resolution to help keep your IT staff productive. Included is software defect support for reporting suspected problems and electronic access to PTFs correcting resolved problems. These problems can be related to any option of the CLF product. After the initial 6 months a subscription plan is available to continue receiving telephone access, electronic access, and problem reporting support. Without a subscription you will continue to have electronic access to PTFs correcting resolved problems.

When you install the run-time generation tools (option 2 of CLF) license (without the precompiler) you receive 3 months of software support. This support includes electronic access to highly-trained technical support specialist to provide fast, accurate problem resolution to help keep your IT staff productive. Included is software defect support for reporting suspected problems and electronic access to PTFs correcting resolved problems. These problems can be related to the generation tools or CLF base run-time. After the initial 3 months a subscription plan is available to continue receiving electronic access and problem reporting support. Without a subscription you will continue to have electronic access to PTFs correcting resolved problems.

When you install the run-time base support, without either the precompiler or the run-time generation tools, you receive electronic access to PTFs correcting resolved problems.

Additional support options, including on-site education for your staff, is available through extended support offerings.

Appendix A. Objects Created by CLF

OBJECTS CREATED WITH THE BASE OPTION OF CLF

The following objects are created when restoring the base option of the CLF product.

Command objects:

Object	Library	Object Type	Public Authorities	Description
ACQDEVCLF	VC2CLF	*Cmd	*Use	Acquire device
CHAIN	VC2CLF	*Cmd	*Use	RPG-like random read
CHGNULACLF	VC2CLF	*Cmd	*Use	Change null attribute
CLFPGMREFB	VC2CLF	*Cmd	*Use	File used for Input and Output
CLFPGMREFI	VC2CLF	*Cmd	*Use	File used for Input
CLFPGMREFO	VC2CLF	*Cmd	*Use	File used for Output
CLFPGMREFU	VC2CLF	*Cmd	*Use	File use is unknown
CLOFCLF	VC2CLF	*Cmd	*Use	Close file
CLOSE	VC2CLF	*Cmd	*Use	RPG-like close file
DLTRCDCLF	VC2CLF	*Cmd	*Use	Delete record
DELETE	VC2CLF	*Cmd	*Use	RPG-like delete record
EXFMT	VC2CLF	*Cmd	*Use	RPG-like write/read display format
FILE	VC2CLF	*Cmd	*Use	RPG oriented file declaration
FRCDTACLF	VC2CLF	*Cmd	*Use	Force data

INCLUDE	VC2CLF	*Cmd	*Use	Include source
INDS	VC2CLF	*Cmd	*Use	RPG oriented indicator declaration
OPEN	VC2CLF	*Cmd	*Use	RPG-like open file
OPNFCLF	VC2CLF	*Cmd	*Use	Open file
POSDBFCLF	VC2CLF	*Cmd	*Use	Position database file
READ	VC2CLF	*Cmd	*Use	RPG-like read next record
READC	VC2CLF	*Cmd	*Use	RPG-like read next changed record
READE	VC2CLF	*Cmd	*Use	RPG-like read next record equal
READP	VC2CLF	*Cmd	*Use	RPG-like read prior record
READPE	VC2CLF	*Cmd	*Use	RPG-like read prior record equal
READRCDCLF	VC2CLF	*Cmd	*Use	Read record
RLSDEVCLF	VC2CLF	*Cmd	*Use	Release device
RLSRCDFCLF	VC2CLF	*Cmd	*Use	Release record
RTVFINFCLF	VC2CLF	*Cmd	*Use	Retrieve file information
RTVNULACLF	VC2CLF	*Cmd	*Use	Retrieve null attribute
RTVVFLCLF	VC2CLF	*Cmd	*Use	Retrieve variable field length
SETDEVCLF	VC2CLF	*Cmd	*Use	Set device
SETGT	VC2CLF	*Cmd	*Use	RPG-like position database file
SETLL	VC2CLF	*Cmd	*Use	RPG-like position database file
SETVFLCLF	VC2CLF	*Cmd	*Use	Set variable field length
UNLOCK	VC2CLF	*Cmd	*Use	RPG-like release record
UPDATE	VC2CLF	*Cmd	*Use	RPG-like update record

UPDRCDCLF	VC2CLF	*Cmd	*Use	Update record
WRITE	VC2CLF	*Cmd	*Use	RPG-like write record
WRKOPNFCLF	VC2CLF	*Cmd	*Exclude	Work with Open Files using CLF
WRTRCDCLF	VC2CLF	*Cmd	*Use	Write record
WRTREADCLF	VC2CLF	*Cmd	*Use	Write/Read display file format
WRTRRNCLF	VC2CLF	*Cmd	*Use	Write record by RRN

Potential command objects:

The following commands are only created if there is not a command in QSYS by the same name.

Object	Library	Object Type	Public Authorities	Description
ACQDEVCLF	QSYS	*Cmd	*Use	Proxy command
CHAIN	QSYS	*Cmd	*Use	Proxy command
CHGNULACLF	QSYS	*Cmd	*Use	Proxy command
CLOFCLF	QSYS	*Cmd	*Use	Proxy command
CLOSE	QSYS	*Cmd	*Use	Proxy command
DLTRCDCLF	QSYS	*Cmd	*Use	Proxy command
DELETE	QSYS	*Cmd	*Use	Proxy command
EXFMT	QSYS	*Cmd	*Use	Proxy command
FILE	QSYS	*Cmd	*Use	Proxy command
FRCDTACLF	QSYS	*Cmd	*Use	Proxy command
INCLUDE	QSYS	*Cmd	*Use	Proxy command

INDS	QSYS	*Cmd	*Use	Proxy command
OPEN	QSYS	*Cmd	*Use	Proxy command
OPNFCLF	QSYS	*Cmd	*Use	Proxy command
POSDBFCLF	QSYS	*Cmd	*Use	Proxy command
READ	QSYS	*Cmd	*Use	Proxy command
READC	QSYS	*Cmd	*Use	Proxy command
READE	QSYS	*Cmd	*Use	Proxy command
READP	QSYS	*Cmd	*Use	Proxy command
READPE	QSYS	*Cmd	*Use	Proxy command
READRCDCLF	QSYS	*Cmd	*Use	Proxy command
RLSDEVCLF	QSYS	*Cmd	*Use	Proxy command
RLSRCDFCLF	QSYS	*Cmd	*Use	Proxy command
RTVFINFCLF	QSYS	*Cmd	*Use	Proxy command
RTVNULACLF	QSYS	*Cmd	*Use	Proxy command
RTVVFLCLF	QSYS	*Cmd	*Use	Proxy command
SETDEVCLF	QSYS	*Cmd	*Use	Proxy command
SETGT	QSYS	*Cmd	*Use	Proxy command
SETLL	QSYS	*Cmd	*Use	Proxy command
SETVFLCLF	QSYS	*Cmd	*Use	Proxy command
UNLOCK	QSYS	*Cmd	*Use	Proxy command
UPDATE	QSYS	*Cmd	*Use	Proxy command
UPDRCDCLF	QSYS	*Cmd	*Use	Proxy command

WRITE	QSYS	*Cmd	*Use	Proxy command
WRKOPNFCLF	QSYS	*Cmd	*Use	Proxy command
WRTRCDCLF	QSYS	*Cmd	*Use	Proxy command
WRTREADCLF	QSYS	*Cmd	*Use	Proxy command
WRTRRNCLF	QSYS	*Cmd	*Use	Proxy command

File objects:

Object	Library	Object Type	Public Authorities	Description
VC200FWOF	VC2CLF	*File	*Use	WRKOPNFCLF display file
VC2MSG	VC2CLF	*MsgF	*Change	Product message file

Program objects:

Object	Library	Object Type	Public Authorities	Description
VC200PACQD	VC2CLF	*Pgm	*Use	N/A
VC200PCLOF	VC2CLF	*Pgm	*Use	N/A
VC200PCPYN	VC2CLF	*Pgm	*Use	N/A
VC200PDLTR	VC2CLF	*Pgm	*Use	N/A
VC200PDPN	VC2CLF	*Pgm	*Use	Displays current partition number and system serial number
VC200PEXIT	VC2CLF	*Pgm	*Exclude	N/A
VC200PFRCD	VC2CLF	*Pgm	*Use	N/A

VC200PGENF	VC2CLF	*Pgm	*Use	N/A
VC200PGENI	VC2CLF	*Pgm	*Use	N/A
VC200PGENK	VC2CLF	*Pgm	*Use	N/A
VC200PGETD	VC2CLF	*Pgm	*Use	N/A
VC200PNOP	VC2CLF	*Pgm	*Use	N/A
VC200POPNF	VC2CLF	*Pgm	*Use	N/A
VC200PRDR	VC2CLF	*Pgm	*Use	N/A
VC200PRFI	VC2CLF	*Pgm	*Use	N/A
VC200PRLSD	VC2CLF	*Pgm	*Use	N/A
VC200PRLSR	VC2CLF	*Pgm	*Use	N/A
VC200PRPG	VC2CLF	*Pgm	*Use	N/A
VC200PRTL	VC2CLF	*Pgm	*Use	N/A
VC200PSETD	VC2CLF	*Pgm	*Use	N/A
VC200PSMEM	VC2CLF	*Pgm	*Use	N/A
VC200PUPDR	VC2CLF	*Pgm	*Use	N/A
VC200PWOF	VC2CLF	*Pgm	*Use	N/A
VC200PWR	VC2CLF	*Pgm	*Use	N/A
VC200PWRTR	VC2CLF	*Pgm	*Use	N/A
VC200SSL	VC2CLF	*SrvPgm	*Use	N/A

Menu objects:

Object	Library	Object Type	Public Authorities	Description
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CMDCLF	VC2CLF	*Menu	*Use	CLF Menu
CMDCLFRPG	VC2CLF	*Menu	*Use	RPG-like menu
VC200HCMD	VC2CLF	*PnlGrp	*Use	Help text for CLF commands
VC200HWOFF	VC2CLF	*PnlGrp	*Use	Help text for WRKOPNFCLF
VC2CLF	VC2CLF	*PrdDfn	*Use	N/A
CLFBASE	VC2CLF	*PrdLod	*Use	N/A

Potential menu objects:

The following menus are only created if there is not a menu in QSYS by the same name.

Object	Library	Object Type	Public Authorities	Description
CMDCLF	QSYS	*Menu	*Use	CLF menu
CMDCLFRPG	QSYS	*Menu	*Use	RPG-like menu

Other objects:

Object	Library	Object Type	Public Authorities	Description
VC200HCMD	VC2CLF	*PnlGrp	*Use	Help text for CLF commands
VC200HWOFF	VC2CLF	*PnlGrp	*Use	Help text for WRKOPNFCLF
VC2CLF	QSYS	*Lib	*Change	CLF product library
VC2CLF	VC2CLF	*PrdDfn	*Use	N/A
CLFBASE	VC2CLF	*PrdLod	*Use	N/A

OBJECTS CREATED WITH OPTION 1 OF CLF

The following objects are created when restoring option 1 of the CLF product.

Command objects:

Object	Library	Object Type	Public Authorities	Description
CLFI	VC2CLF	*Cmd	*Use	Proxy for CRTBNDCLF
CLFO	VC2CLF	*Cmd	*Use	Proxy for CRTCLFPGM
CRTBNDCLF	VC2CLF	*Cmd	*Use	Create bound CLF program
CRTCLFMOD	VC2CLF	*Cmd	*Use	Create CLF module
CRTCLFPGM	VC2CLF	*Cmd	*Use	Create CLF program

Potential command objects:

The following commands are only created if there is not a command in QSYS by the same name.

Object	Library	Object Type	Public Authorities	Description
CLFI	QSYS	*Cmd	*Use	Proxy command
CLFO	QSYS	*Cmd	*Use	Proxy command
CRTBNDCLF	QSYS	*Cmd	*Use	Proxy command
CRTCLFMOD	QSYS	*Cmd	*Use	Proxy command
CRTCLFPGM	QSYS	*Cmd	*Use	Proxy command

File objects:

Object	Library	Object Type	Public Authorities	Description
VC201FCRTL	VC2CLF	*File	*Exclude	Printer file
VC201FFRBM	VC2CLF	*File	*Exclude	N/A
VC201FMSG	VC2CLF	*File	*Exclude	N/A
VC201FVARS	VC2CLF	*File	*Exclude	N/A

Program objects:

Object	Library	Object Type	Public Authorities	Description
VC201PCRTP	VC2CLF	*Pgm	*Use	N/A
VC201PDCLF	VC2CLF	*Pgm	*Exclude	N/A
VC201PEXIT	VC2CLF	*Pgm	*Exclude	N/A

Other objects:

Object	Library	Object Type	Public Authorities	Description
CLFDEV	VC2CLF	*PrdLod	*Use	N/A

OBJECTS CREATED WITH OPTION 2 OF CLF

The following objects are created when restoring option 2 of the CLF product.

Command objects:

Object	Library	Object Type	Public Authorities	Description
GENFFDCLF	VC2CLF	*Cmd	*Use	Generate file field definition
GENFKSCLF	VC2CLF	*Cmd	*Use	Generate file key structure
GENINDCLF	VC2CLF	*Cmd	*Use	Generate indicators

Potential command objects:

The following commands are only created if there is not a command in QSYS by the same name.

Object	Library	Object Type	Public Authorities	Description
GENFFDCLF	QSYS	*Cmd	*Use	Proxy command
GENFKSCLF	QSYS	*Cmd	*Use	Proxy command
GENINDCLF	QSYS	*Cmd	*Use	Proxy command

Program objects:

Object	Library	Object Type	Public Authorities	Description
VC202PEXIT	VC2CLF	*Pgm	*Exclude	N/A

Other objects:

Object	Library	Object Type	Public Authorities	Description
CLFRTT	VC2CLF	*PrdLod	*Use	N/A

OBJECTS CREATED WITH OPTION 3 OF CLF

The following objects are created when restoring option 3 of the CLF product.

File objects:

Object	Library	Object Type	Public Authorities	Description
QCMDSRC	VC2CLF	*File	*Use	Contains sample command definitions
QDDSSRC	VC2CLF	*File	*Use	Contains sample file definitions
VC2CLSRC	VC2CLF	*File	*Use	Contains sample CLF program source
VC2DPT	VC2CLF	*File	*Change	Sample department physical file
VC2DPTDSP1	VC2CLF	*File	*Change	Sample department display file
VC2DPTEMPL	VC2CLF	*File	*Change	Sample department display file
VC2EMP	VC2CLF	*File	*Change	Sample employee physical file
VC2EMPDPPT	VC2CLF	*File	*Change	Sample employee logical file
VC2EMPDSP1	VC2CLF	*File	*Change	Sample employee display file
VC2EMPDSP2	VC2CLF	*File	*Change	Sample employee display file
VC2EMPEXT	VC2CLF	*File	*Change	Sample employee logical file
VC2EMPNAME	VC2CLF	*File	*Change	Sample employee logical file
VC2EMPSTS	VC2CLF	*File	*Change	Sample employee logical file
VC2FEMPTY	VC2CLF	*File	*Change	Sample display file
VC2INVITES	VC2CLF	*File	*Change	Sample display file

VC2POSDSP	VC2CLF	*File	*Change	Sample display file
VC2POSPRT	VC2CLF	*File	*Change	Sample printer file
VC2PRTEXT	VC2CLF	*File	*Change	Sample printer file

Program objects:

Object	Library	Object Type	Public Authorities	Description
VC203PEXIT	VC2CLF	*Pgm	*Exclude	N/A

Other objects:

Object	Library	Object Type	Public Authorities	Description
CLFSMP	VC2CLF	*PrdLod	*Use	N/A