BEA eLink Adapter for R/3 BAPI/RFC

User's Guide

.

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eLink Adapter for R/3 BAPI/RFC User’s Guide

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About This Document

This document provides instructions for installing and configuring the BEA eLink Adapter for R/3 BAPI/RFC product on a UNIX or Windows NT system.

The *BEA eLink Adapter for R/3 BAPI/RFC User's Guide* is organized as follows:

- Chapter 1, "Introducing BEA eLink Adapter for R/3 BAPI/RFC," introduces you to BEA eLink Adapter for R/3 BAPI/RFC and provides overview information on integrating applications with R/3.
- Chapter 2, "Integrating with RFC/BAPI," provides information about BAPI/RFC integration.
- Chapter 3, "Preinstallation Tasks," describes system requirements and information that you need to review before installing BEA eLink Adapter for R/3 BAPI/RFC.
- Chapter 4, "Installing BEA eLink Adapter for R/3 BAPI/RFC," provides instructions for installing BEA eLink Adapter for R/3 BAPI/RFC on UNIX and Windows NT systems.
- Chapter 5, "TUXEDO Initialization File," describes how to configure TUXEDO to enable integration with BEA eLink Adapter for R/3 BAPI/RFC.
- Chapter 6, "Configuring BAPI/RFC Integration," describes how to configure BEA eLink Adapter for R/3 BAPI/RFC to enable access to RFCs/BAPIs on your SAP R/3 system.
- Chapter 7, "Configuring R/3 Connections," describes how to configure the eLink to R/3 and R/3 to eLink connections to your R/3 system
- Appendix A, "Sample cr3_bapi.ubb File," describes the sample `cr3.ubb` file that accompanies BEA eLink Adapter for R/3 BAPI/RFC.

What You Need to Know

This document is intended for system managers who are responsible for installing products in the UNIX or Windows NT environments and for configuring layered products. Portions of this guide are intended for experienced R/3 users with knowledge of BAPI/RFC configuration.

e-docs Web Site

BEA product documentation is available on the BEA corporate Web site. From the BEA Home page, click on Product Documentation or go directly to the "e-docs" Product Documentation page at http://e-docs.beasys.com.

How to Print the Document

You can print a copy of this document from a Web browser, one file at a time, by using the File—>Print option on your Web browser.

A PDF version of this document is available on the BEA eLink Adapter for R/3 BAPI/RFC documentation Home page on the e-docs Web site (and also on the documentation CD). You can open the PDF in Adobe Acrobat Reader and print the entire document (or a portion of it) in book format. To access the PDFs, open the BEA eLink Adapter for R/3 BAPI/RFC documentation Home page, click the PDF files button and select the document you want to print.

If you do not have the Adobe Acrobat Reader, you can get it for free from the Adobe Web site at http://www.adobe.com/.

Related Information

The following BEA WebLogic Enterprise documents contain information that is relevant to using the idltojava compiler and understanding how to implement Java CORBA applications in the WLE system.

For more information in general about Java IDL and Java CORBA applications, refer to the following sources.

- The OMG Web Site at http://www.omg.org/
- The Sun Microsystems, Inc. Java site at http://java.sun.com/

For more information about CORBA and distributed object computing, transaction processing, and Java, refer to the Bibliography at http://edocs.beasys.com/.

Contact Us!

Your feedback on the BEA WebLogic Enterprise documentation is important to us. Send us e-mail at **docsupport@beasys.com** if you have questions or comments. Your comments will be reviewed directly by the BEA professionals who create and update the BEA eLink Adapter for R/3 BAPI/RFC documentation.

In your e-mail message, please indicate that you are using the documentation for the BEA BEA eLink Adapter for R/3 BAPI/RFC 5.0 release.

If you have any questions about this version of BEA BEA eLink Adapter for R/3 BAPI/RFC, or if you have problems installing and running BEA BEA eLink Adapter for R/3 BAPI/RFC, contact BEA Customer Support through BEA WebSupport at **www.beasys.com**. You can also contact Customer Support by using the contact information provided on the Customer Support Card, which is included in the product package.

When contacting Customer Support, be prepared to provide the following information:

- Your name, e-mail address, phone number, and fax number

- Your company name and company address
- Your machine type and authorization codes
- The name and version of the product you are using
- A description of the problem and the content of pertinent error messages

Documentation Conventions

The following documentation conventions are used throughout this document.

Convention	Item
boldface text	Terms defined in the glossary.
Ctrl+Tab	You must press two or more keys simultaneously.
italics	Emphasis or book titles.

`monospace text`	Code samples, commands and their options, data structures and their members, data types, directories, and file names and their extensions. Monospace text also indicates text that you must enter from the keyboard.
	Examples:
	`#include <iostream.h> void main ( ) the pointer psz`
	`chmod u+w *`
	`\tux\data\ap`
	`.doc`
	`tux.doc`
	`BITMAP`
	`float`

`monospace boldface text`	Significant words in code. *Example*: `void` **`commit`** `( )`

Convention	Item
monospace italic text	Variables in code. *Example*: `String expr`
UPPERCASE TEXT	Device names, environment variables, and logical operators. *Example*s: LPT1 SIGNON OR
`{ }`	A set of choices in a syntax line. The braces themselves should never be typed.
`[ ]`	Optional items in a syntax line. The brackets themselves should never be typed. *Example*: `buildobjclient [-v] [-o name ] [-f file-list]... [-l file-list]...`
`|`	Separates mutually exclusive choices in a syntax line. The symbol itself should never be typed.
`...`	One of the following in a command line: ■ That an argument can be repeated several times in a command line. ■ That the statement omits additional optional arguments. ■ That you can enter additional parameters, values, or other information. The ellipsis itself should never be typed. *Example*: `buildobjclient [-v] [-o name ] [-f file-list]... [-l file-list]...`
. . .	Omission of items from a code example or from a syntax line. The vertical ellipsis itself should never be typed.

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CHAPTER

1 Introducing BEA eLink Adapter for R/3 BAPI/RFC

This topic introduces BEA eLink Adapter for R/3 BAPI/RFC. It includes the following main sections:

- About BEA eLink Adapter for R/3 BAPI/RFC
- SAP R/3 Environment Integration Issues
- BEA Enterprise Application Integration Solution
- Architectural Overview
- Integration Strategies
- Integrating Applications with R/3

About BEA eLink Adapter for R/3 BAPI/RFC

BEA eLink Adapter for R/3 BAPI/RFC (Business Application Programming Interface / Remote Function Call) is the infrastructure of choice for application integration with the SAP R/3 environment. BEA eLink Adapter for R/3 BAPI/RFC works with mission-critical, high-performance middleware to enable easy application integration with and real-time access to SAP R/3 transactions, functions and data.

A production-proven solution, eLink Adapter for BAPI/RFC provides an enterprise-based approach to integrating SAP R/3 with applications in all industry-leading computer environments.

SAP R/3 Environment Integration Issues

SAP R/3 is a complete information technology solution that provides an integrated suite of financial, distribution, human resources, and manufacturing applications that can be customized to meet customer needs.

Many firms implementing SAP R/3 realize that full integration between SAP R/3 and their own applications is crucial in order to maximize the effectiveness of their entire environment. However, because numerous, heterogeneous computing environments exist across the enterprise, integration has been costly to implement and difficult to maintain.

BEA Enterprise Application Integration Solution

BEA eLink Adapter for R/3 BAPI/RFC assures ready, high-performance and transparent access to mission-critical applications and information across the network with a single, standard programming interface.

BEA eLink Adapter for R/3 BAPI/RFC builds gateways that can be customized for specific customer needs. These gateways enable interoperability between BEA middleware applications and legacy mainframe environments. Utilization of BEA eLink Adapter for R/3 BAPI/RFC provides distributed access to SAP R/3 data from industry-leading applications and eliminates the need for applications running in the SAP R/3 environment in order to access ‘bet-the-business’ data and functions.

Key Benefits

- Incorporates third-party packages into the SAP R/3 environment
- Empowers non-SAP R/3 applications to execute SAP R/3 applications
- Enables the reduction of application development time
- Allows significant "reutilization" of existing servers
- Provides faster and smoother deployment of SAP R/3
- Accommodates links between non-SAP R/3 GUIs and SAP R/3 or between cooperating servers

BEA eLink Adapter for R/3 BAPI/RFC Business Applicability

In addition to empowering the successful integration of TUXEDO-enabled applications with SAP R/3 in heterogeneous multi-platform environments, eLink Adapter for R/3 ALE makes it possible for companies to access SAP R/3 services, maintain secure business data, and simplify forward migration to new releases of SAP R/3. BEA eLink Adapter for R/3 BAPI/RFC's integration efficiency has the robustness and high-performance required of a permanent element in the overall business solution.

Licensing Requirements

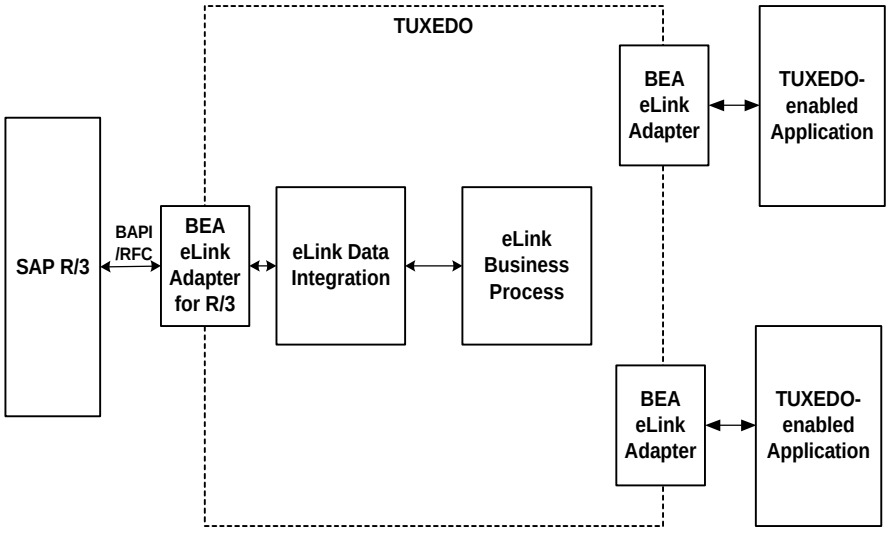
The eLink adapter for R/3 BAPI/RFC requires the following two licenses for operation:

- eLink Platform 1.1
- eLink Adapter for R/3 BAPI/RFC 1.5

Architectural Overview

Figure 1-1 shows the architecture of BEA eLink Adapter for R/3 BAPI/RFC:

Figure 1-1 Architecture of BEA eLink Adapter for R/3 BAPI/RFC



BEA eLink Adapter for R/3 BAPI/RFC includes the following components:

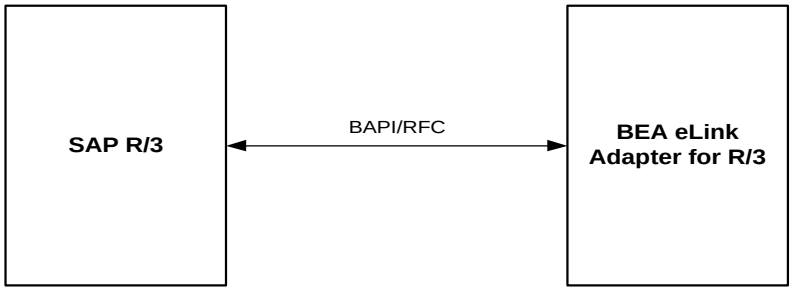
- **eLink Data Integration** manages data transformation: data formats, data content, and rules.
- **eLink Business Process** manages process flow: state-based business processes consisting of multiple tasks.

BEA eLink Adapter for R/3 BAPI/RFC communicates with R/3 via SAP's BAPI/RFC technology. The adapter provides for bi-directional communication between R/3 and eLink.

Integration Strategies

The BEA eLink Adapter for R/3 BAPI/RFC provides for a request/response from R/3 to eLink and from eLink to R/3 as shown in Figure 1-2. See your SAP documentation for more information about SAP BAPI/RFC technologies.

Figure 1-2 Communication between BEA eLink Adapter for R/3 BAPI/RFC and SAP R/3



Integrating Applications with R/3

This section introduces the key concepts involved in integrating TUXEDO-enabled applications with R/3 using BEA eLink Adapter for R/3 BAPI/RFC. It includes the following topics:

- TUXEDO ATMI
- FML32 Field Definitions

TUXEDO ATMI

BEA eLink Adapter for R/3 BAPI/RFC and TUXEDO-enabled applications communicate by exchanging TUXEDO FML32 buffers. Client applications that need access to the data and functionality of R/3 use the TUXEDO application to transaction monitor interface (ATMI) to send request messages to the BEA eLink Adapter for R/3 BAPI/RFC and receive the response messages. The messages exchanged are FML32 buffers. Server applications that allow R/3 access to their data and functionality will use the TUXEDO ATMI to receive request messages from BEA eLink Adapter for R/3 BAPI/RFC and send response messages.

For more information on the features of TUXEDO, programming with the TUXEDO ATMI, and encoding and decoding FML buffers, see the *TUXEDO Programmer's Guide and the BEA TUXEDO Reference Manual* (Section 3C).

FML32 Field Definitions

BEA eLink Adapter for R/3 BAPI/RFC comes with an FML field table (`cr3_bapi.fml` file) that defines the fields used in FML32 buffers. This file resides in the following directory:

`your eLink installation path``/elink/adapters/sapr3_bapi/config`

The `cr3_bapi.fml` file contents are as follows:

Listing 1-1 FML Field Table (cr3_bapi.fml file)

```
# eLink Adapter for R/3 BAPI/RFC
# name                        number  type       flags comments

# eLink error FML fields
# name                        number  type       flags comments

ELINK_ADAPTER_ERR_CODE        200     string     -     -
ELINK_ADAPTER_ERR             201     string     -     -
ELINK_APP_ERR                 202     string     -     -
```

Note: The field numbers are default values only. You can change these values if they are already in use by another application.

Table 1-1 describes these FML fields:

Table 1-1 FML Field Definitions in the cr3_bapi.fml File

Field Name	Description
CR3_ERROR_TEXT	Error text.
ELINK_ADAPTER_ERR_CODE	eLink error category.
ELINK_ADAPTER_ERR	BEA eLink Adapter for R/3 BAPI/RFC error code and text.

Note: BEA eLink Adapter for R/3 BAPI/RFC imposes no restriction on the length of string values sent and received using TUXEDO. The size is determined by the target application. For example, the length of an import parameter is specified by R/3. Note that the maximum size of a TUXEDO message is 2GB.

See your TUXEDO documentation for more information about FML32 buffers and field definition tables.

CHAPTER

2 Integrating with BAPI/RFC

This topic describes how to integrate SAP R/3 SAP remote function calls (RFCs) and business application programming interfaces (BAPIs) in the BEA eLink Adapter for R/3 BAPI/RFC environment. It includes the following main sections:

- BAPI/RFC Integration
- BAPI/RFC eLink to R/3 Server
- RFC R/3 to eLink Server

For information about setting up RFC processing, see Chapter 6, "Configuring for BAPI/RFC Integration," in this guide.

BAPI/RFC Integration

BAPI/RFC eLink to R/3 is a component of the BEA eLink Adapter for R/3 BAPI/RFC product that allows TUXEDO applications to invoke any ABAP/4 functions that have been RFC-enabled. The RFC function may be the underlying RFC for any BAPI. The adapter will return the response from R/3 back to the TUXEDO application.

RFC R/3 to eLink is a TUXEDO server that allows R/3 to send request messages to TUXEDO applications and receive the response message. The request message specifies the data and functionality of the TUXEDO application to which R/3 requires access. The TUXEDO application returns the result of the access in the response message.

BAPI/RFC eLink to R/3 Server

BAPI/RFC eLink to R/3 is a component of the BEA eLink Adapter for R/3 BAPI/RFC product that allows TUXEDO applications and other non-R/3 applications to invoke any ABAP/4 functions that have been BAPI/RFC-enabled. BAPI/RFC eLink to R/3 is a TUXEDO server that has a generic service, CR3_RFC_IN, which invokes any ABAP/4 function. The CR3_RFC_IN service is aliased to unique services corresponding to ABAP/4 functions.

Developers configure the ABAP/4 functions they want to invoke and the service names that are advertised. The RFC R/3 to eLink server then advertises these service names. The RFC can then be invoked by the service name just as any other TUXEDO service.

This section describes how to invoke BAPI/RFC-enabled ABAP/4 functions in the TUXEDO environment using RFC eLink to R/3, a TUXEDO server, via synchronous BAPI/RFC. The following topics are covered:

- BAPI/RFC eLink to R/3 Information Flow
- ABAP/4 Parameters

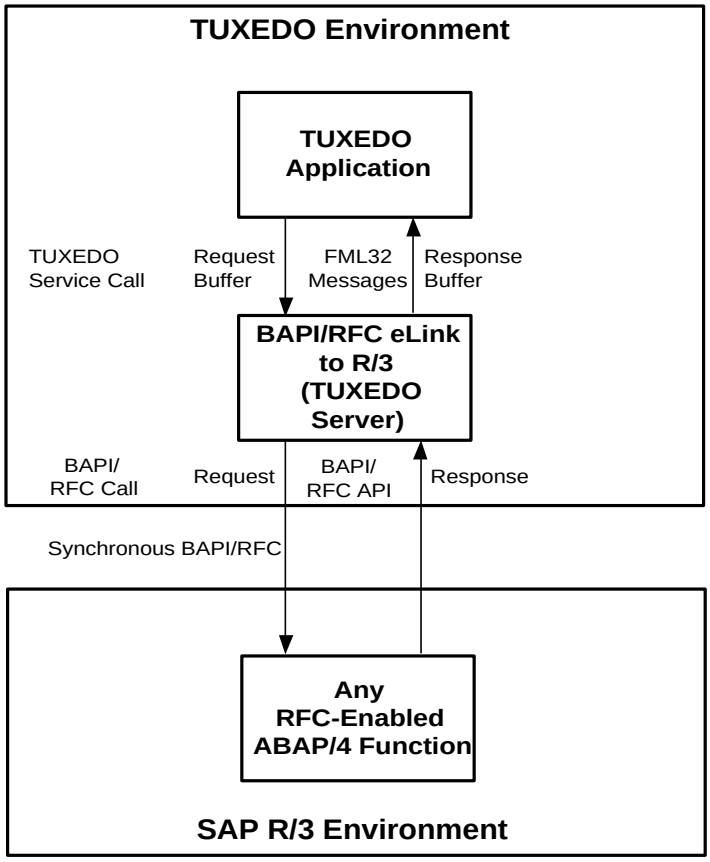
- FML32 Field Definitions for BAPI/RFC eLink to R/3
- Configuring Export Parameters and Export Tables
- Handling Problems with BAPIs/RFCs

For information about setting up BAPI/RFC processing, see Chapter 6, “Configuring BAPI/RFC Integration,” and Chapter 7, “Configuring R/3 Connections.”

BAPI/RFC eLink to R/3 Information Flow

BAPI/RFC eLink to R/3 allows a TUXEDO application to act as a client to R/3. Figure 2-1 shows the information flow for invoking BAPI/RFC-enabled ABAP/4 functions:

Figure 2-1 Information Flow for Invoking ABAP/4 Functions



The information flow for invoking ABAP/4 functions is as follows:

1. One or more instances of BAPI/RFC eLink to R/3 (a TUXEDO server) start up and advertise each ABAP/4 function that can be invoked as a TUXEDO service.
2. The calling application prepares an FML32 request buffer that contains the applicable import parameters and import tables for the BAPI/RFC.

   It is the developer's responsibility to ensure that the names of import parameters and import tables are spelled exactly as they appear in the ABAP/4 function signature.

3. The calling application makes a service call to the TUXEDO service associated with the BAPI/RFC, passing in the FML32 request buffer parameter to TUXEDO.
4. The BAPI/RFC eLink to R/3 service (CR3_RFC_IN) determines the service name used to invoke it and therefore knows the associated ABAP/4 function.
5. BAPI/RFC eLink to R/3 processes the FML32 request buffer and then makes the remote function call on R/3 using the synchronous RFC API, passing the import parameters to R/3.
6. The executed ABAP/4 function processes the input parameters and returns the results to BAPI/RFC eLink to R/3.
7. BAPI/RFC eLink to R/3 receives the results, and, depending on the success of the RFC call, does one of the following:
   - If the RFC call succeeded, BAPI/RFC eLink to R/3 populates the FML32 response buffer with the returned data. BAPI/RFC eLink to R/3 includes only data for the export parameters and export tables that are listed in the CR3_EXPORT_PARAMS and CR3_EXPORT_TABLES environment variables. BAPI/RFC eLink to R/3 returns the FML32 response buffer to the calling application, as well as TPSUCCESS with the tpurcode error code set to zero (0).
   - If the RFC call failed, BAPI/RFC eLink to R/3 populates the FML32 response buffer with information about the error:

     R/3-level errors. BAPI/RFC eLink to R/3 populates the ELINK_APP_ERR field with the message text returned from R/3. BAPI/RFC eLink to R/3 returns the FML32 response buffer to the calling application, as well as TPFAIL with the tpurcode set to 0.

     Adapter-level errors. BAPI/RFC eLink to R/3 populates the ELINK_ADAPTER_ERR_CODE and ELINK_ADAPTER_ERR fields with the appropriate adapter-level error code and BEA eLink Adapter for R/3 RFC-specific error code and message. BAPI/RFC eLink to R/3 returns the FML32 response buffer to the calling application, as well as TPFAIL with the tpurcode set to -1. Alternatively, for uncorrectable errors such as a memory corruption problem, BAPI/RFC eLink to R/3 returns TPEXIT (which causes the service to shut down) with the tpurcode set to -1.
8. The calling application processes the response buffer as appropriate.

ABAP/4 Parameters

ABAP/4 functions use the following types of parameters:

- **Import parameters** are passed into an ABAP/4 function.
- **Export parameters** are passed out of an ABAP/4 function.
- **Tables** are passed into, out of, or both into *and* out of an ABAP/4 function. Tables are similar to arrays, consisting of 1+ rows, where each row is a specific type (such as a string) or a structure. Tables are passed by reference.
- **Exceptions** are defined error messages that are passed out of an ABAP/4 function if R/3 raises an exception (a business-level error).

The exact parameters vary with each ABAP/4 function and are defined in the function's ABAP/4 function signature. The following defines a generic ABAP/4 function:

```
FUNCTION FUNCTION_NAME
IMPORT
     IMPORT_PARAM_1
     IMPORT_PARAM_2
EXPORT
     EXPORT_PARAM_1
     EXPORT_PARAM_2
TABLE
     TABLE_IN
     TABLE_OUT
     TABLE_IN_OUT
EXCEPTION
     EXCEPTION_1
     EXCEPTION_2
```

This function signature includes two import parameters and one import table that it reads as input, two export parameters and one export table that it writes as output, one table (TABLE_IN_OUT) that it reads on input and writes as output, and two exceptions that it can raise if an R/3 error occurs.

FML32 Field Definitions for BAPI/RFC eLink to R/3

In TUXEDO messages, import parameters, export parameters, table, and exceptions are represented as named fields in FML32 buffers. A calling application uses two kinds of buffers:

- **Request Buffers** contain import parameters and import tables.
- **Response Buffers** contain export parameters and export tables as well as success/failure information (R/3-level errors or adapter errors).

The calling application constructs a request buffer containing import parameters and import tables. BAPI/RFC eLink to R/3 allocates a response buffer and populates it with data returned from the ABAP/4 function according to the settings of the CR3_EXPORT_PARAMS and CR3_EXPORT_TABLES environment variables in the configuration file.

Request Buffers

Before invoking a service associated with an BAPI/RFC call, a calling application prepares an FML32 request buffer that contains the following information:

- **Import parameters**. The Field Name is the import parameter name as specified in the ABAP/4 function signature, and the Field Value is the parameter value to pass into the ABAP/4 function. Each import parameter can consist of a single field or multiple fields.
- **Import tables**. Tables consist of one or more rows of data. Each row is an occurrence of an FML32 field. The Field Name is the table name as specified in the ABAP/4 function signature, and the Field Value is a string containing the row data to pass into the ABAP/4 function. The calling application is responsible for passing each field of a table row in a single FML buffer field.

The calling application passes this request buffer when it invokes the service associated with the BAPI/RFC.

For example, for the function signature shown in the section “About ABAP/4 Parameters”, a calling application might construct the following FML32 request buffer:

Table 2-1 Request Buffer for a Sample ABAP/4 Function

FML32 Field Name	Field Value	Data Type
IMPORT_PARAM_1	ParameterValue	String
IMPORT_PARAM_2	ParameterValue	String
TABLE_IN	TableRowValue	String
TABLE_IN	TableRowValue	String
TABLE_IN	TableRowValue	String
..	..	String
TABLE_IN_OUT	TableRowValue	String
TABLE_IN_OUT	TableRowValue	String
TABLE_IN_OUT	TableRowValue	String
..	..	String

In this example, the TABLE_IN_OUT table is both an import and export table. Therefore, the request buffer contains table rows to be passed into the ABAP/4 function. In addition, TABLE_IN_OUT is specified in the CR3_EXPORT_TABLES environment variable in the configuration file so that data from this table is returned in the response buffer.

Note: It is the responsibility of the calling application to ensure that the names of import parameters and import tables are spelled exactly as they appear in the ABAP/4 function signature.

Response Buffers

The BAPI/RFC eLink to R/3 allocates an FML32 response buffer. After executing the ABAP/4 function, BAPI/RFC eLink to R/3 populates the response buffer with the results, which include:

- **Export parameters**. The Field Name is the export parameter name as specified in the ABAP/4 function signature and the Field Value is the parameter value returned from the ABAP/4 function. Each export parameter consists of only one field.
- **Export tables**. Tables consist of one or more rows of data. Each row is an occurrence of an FML32 field. The Field Name is the table name as specified in the ABAP/4 function signature and the Field Value is a string containing the row data returned from the ABAP/4 function. The calling application is responsible for anticipating the fixed-position format of the row data returned from R/3 and for retrieving and processing the row data accordingly.
- **R/3 error information**. The ELINK_APP_ERR field contains the text of an R/3 error, if any, that was raised by the ABAP/4 function.
- **Adapter error information**. Two FML32 fields, ELINK_ADAPTER_ERR_CODE and ELINK_ADAPTER_ERR, contain information about adapter errors.

For example, for the function signature specified in Listing 2-1, "ABAP/4 Function Signature," earlier in this topic, BAPI/RFC eLink to R/3 might return the following FML32 response buffer:

Table 2-2 Response Buffer for Sample ABAP/4 Function

FML32 Field Name	Field Value	Data Type
EXPORT_PARAM_1	ParameterValue	String
EXPORT_PARAM_2	ParameterValue	String
TABLE_OUT	TableRowValue	String
TABLE_OUT	TableRowValue	String
TABLE_OUT	TableRowValue	String
..	..	String
TABLE_IN_OUT	TableRowValue	String
TABLE_IN_OUT	TableRowValue	String
TABLE_IN_OUT	TableRowValue	String
..	..	String

Note: Error fields (ELINK_APP_ERR, ELINK_ADAPTER_ERR_CODE, and ELINK_ADAPTER_ERR) appear in the response buffer only if an R/3 error or adapter error occurs.

Configuring Export Parameters and Export Tables

Two environment variables control which export parameters and export tables are included in the response buffer:

- CR3_EXPORT_PARAMS specifies the list of export parameters that BAPI/RFC eLink to R/3 includes in the response buffer.
- CR3_EXPORT_TABLES specifies the list of export tables that BAPI/RFC eLink to R/3 includes in the response buffer.

After the ABAP/4 function is executed, BAPI/RFC eLink to R/3 populates the response buffer with these values. If an export parameter or export table is not specified in this list, BAPI/RFC eLink to R/3 discards it even if it is returned from the ABAP/4 function. See “Configuring BAPI/RFC” in Chapter 6, “Configuring BAPI/RFC Integration,” of this guide.

Handling Problems with BAPIs/RFCs

Two kinds of problems can arise when executing BAPI/RFCs:

- **R/3 errors** indicate business-level errors that are raised by the ABAP/4 function, such as invalid import data. If an R/3 error occurs, BAPI/RFC eLink to R/3 returns a response buffer containing *only* the ELINK_APP_ERR field.
- **Adapter errors**, which indicate any other infrastructure-level problems, such as an R/3 connection error. If an adapter error occurs, BAPI/RFC eLink to R/3 returns a response buffer containing *only* the ELINK_ADAPTER_ERR_CODE and ELINK_ADAPTER_ERR fields.

It is the responsibility of the calling application to retrieve and process exception and error information accordingly.

Handling R/3 Errors

If an exception is raised when executing the ABAP/4 function on R/3, BAPI/RFC eLink to R/3 behaves as follows:

- Populates the ELINK_APP_ERR field in the response buffer with the text of the R/3 error
- Returns TPFAIL with the tpurcode set to zero (0)

After making the service call, the calling application should check the return value and tpurcode. If TPFAIL is returned with tpurcode error code set to zero (0), the application should parse the text in the ELINK_APP_ERR field in the response buffer and respond appropriately.

Handling Adapter Errors

If an adapter error occurs when executing an ABAP/4 function, BAPI/RFC eLink to R/3 behaves as follows:

- Populates the ELINK_ADAPTER_ERR_CODE field in the response buffer with the adapter error category
- Populates the ELINK_ADAPTER_ERR field in the response buffer with the BEA eLink Adapter for R/3 BAPI/RFC error code and message

- Returns TPFAIL with the tpurcode set to –1 or, if the error is an uncorrectable one (such as a memory allocation failure), then BAPI/RFC eLink to R/3 returns TPEXIT with the tpurcode set to –1
- Writes a message to the error log

After making the service call, the calling application should check the return value and tpurcode. If TPFAIL or TPEXIT is returned and tpurcode is –1, it should parse the text in the ELINK_APP_ERR field in the response buffer and respond appropriately.

Checking the Error Log

If BAPI/RFC eLink to R/3 encounters an adapter level error, it logs the following information to the TUXEDO userlog:

- The adapter error category. For example, if the BAPI/RFC eLink to R/3 server cannot start up, the adapter error category in the log entry is ELINK_ECONFIG.
- An error code and text that is specific to BEA eLink Adapter for R/3 BAPI/RFC (the same text that is returned in the ELINK_ADAPTER_ERROR field).
- A unique code identifying where in the code the error was encountered.

Refer to your TUXEDO documentation for more information about the TUXEDO userlog.

RFC R/3 to eLink Server

This section describes how R/3 applications access TUXEDO services by using the RFC/BAPI R/3 to eLink connection.

- RFC R/3 to eLink Server Application
- Information Flow of the RFC R/3 to eLink
- Calling a TUXEDO Service from an ABAP/4 Function
- Error Handling
- Error Return Codes

RFC R/3 to eLink Server Application

Some integration requirements may require R/3 to access the data and functionality of a TUXEDO application. When R/3 needs access to the data and functionality of the TUXEDO application during its business logic flow, R/3 will initiate the communication. The TUXEDO applications must be ready to service the requests from R/3.

RFC R/3 to eLink takes calls coming out of SAP, builds the FML32 message, and then generates the service call. After the service call, a response is initiated from the target application. (Usually eLink Server or some other TUXEDO server, which processes the FML32 message and returns a response — tpcall(), receives an FML32 message.)

RFC R/3 to eLink is the component of BEA eLink Adapter for R/3 BAPI/RFC that allows R/3 to act as a client application to a TUXEDO service. RFC R/3 to eLink is a TUXEDO server that allows R/3 to send request messages to TUXEDO applications and receive the response message. The request message specifies the data and functionality of the TUXEDO application to which R/3 requires access. The TUXEDO application returns the result of the access in the response message.

The TUXEDO applications must be able to receive the request messages, process the request, and send the response message.

RFC R/3 to eLink handles remote function calls from R/3. Therefore, R/3 communicates with TUXEDO applications in the same manner that R/3 invokes an ABAP/4 function or communicates with other R/3 systems using BAPI/RFC. This significantly reduces the effort required to implement the integration.

RFC R/3 to eLink can be called from any ABAP/4 program or DynPro flow. The most likely place for such calls would be in the user exits of transactions and ABAP/4 reporting programs that need access to non-R/3 programs.

Structure of RFC R/3 to eLink

The RFC R/3 to eLink structure consists of two main components:

- **cr3rfcout** is the program that handles messages exchanged between R/3 and the TUXEDO application.
- **Any ABAP/4 function** invokes the external cr3rfcout program to send and receive messages over TUXEDO.

The communication is synchronous. For synchronous communication, cr3rfcout will immediately return to the calling ABAP/4 program after sending the request message.

Because the contents of the import parameters, export parameters, and tables determine the message to be sent, the ABAP/4 program only needs to process the data in the request and response messages by using a standard ABAP/4 data structure.

ABAP/4 Function Interface

ABAP/4 functions have a function signature that defines the interface:

```
FUNCTION function_name
IMPORTING
       Import_parameter_1
       Import_parameter_2
       ..
EXPORTING
       Export_parameter_1
       Export_parameter_2
```

```
        ..
TABLES
        Table_1
        Table_2
        Table_3
        ..
EXCEPTIONS
        Exception_1
        Exception_2
        ..
```

About Parameters and Tables

Parameters that are passed into the function are termed **import parameters**, and parameters that are returned are **export parameters**. **Exceptions** are defined error messages that the function can return to signal an error condition. A **table** is similar to an array. It consists of one or more rows, where each row is a specific type (for example, a string) or a structure. Tables are passed by reference and can be imported, exported, or both.

In the above function signature, the function takes the two import parameters as input and returns the two export parameters as output. In this example, the function reads input data from `Table_1` and `Table_2` and returns output data in `Table_2` and `Table_3`. Therefore, `Table_1` may be bi-directional. The functions can raise two exceptions, if an error occurs.

Information Flow of the RFC R/3 to eLink

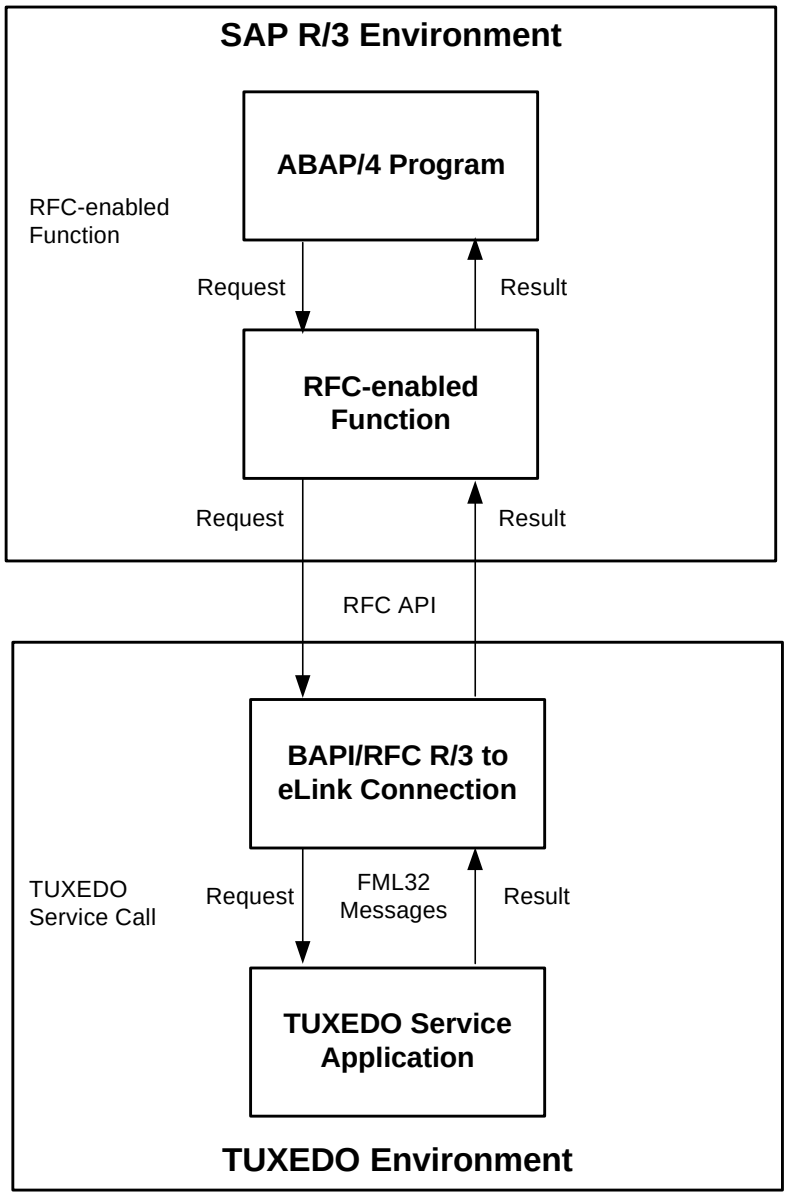
RFC R/3 to eLink may allow R/3 to act as a client to a TUXEDO server application.

The information flow for using the RFC R/3 to eLink is as follows:

1. One or more instances of RFC R/3 to eLink (a TUXEDO server) start up and register a program ID with the R/3 Gateway. RFC R/3 to eLink runs in register mode and listens for messages associated with that program ID on the registered port.
2. RFC R/3 to eLink also registers the R/3 BAPI/RFC calls, which are specified in the configuration file.
3. The ABAP/4 function calls an R/3 BAPI/RFC call, which is registered in an instance of the RFC R/3 to eLink server on the port specified by the destination, passing the function parameters.
4. RFC R/3 to eLink builds an FML32 request buffer, specifying the name of the TUXEDO application/function to invoke and the parameters to pass to the function.
5. RFC R/3 to eLink makes a service call to the named TUXEDO application, passing the FML32 request buffer containing the parameter information.
6. The TUXEDO application reads the FML32 request buffer, processes the request, sets the tpurcode, and returns the result in an FML32 response buffer to the RFC R/3 to eLink.
7. The RFC R/3 to eLink returns the result to the ABAP/4 function.
8. The ABAP/4 function returns the result to the ABAP/4 program.
9. The ABAP/4 program processes the results as appropriate.

Figure 2-2 illustrates the information flow of the RFC R/3 to eLink:

Figure 2-2 Information Flow of the RFC R/3 to eLink



Calling a TUXEDO Service from an ABAP/4 Function

This section contains TUXEDO action invocation requirements.

Mapping of R/3 Import Parameters and Tables to FML32 Request Buffer

The FML32 request buffer will be used to pass data to the TUXEDO action by defining the following:

- What import parameters are to be passed into the input buffer and the values of those input parameters
- What import tables are to be passed into the input buffer and the values of those import tables.

To invoke the TUXEDO action, the FML32 request buffer will contain the following fields:

Table 2-3 Mapping R/3 Import Parameters and Tables to FML32 Request Buffer

FML32 Field Name	Field Value	Value Type
Import_parameter_1	ParameterValue	Parameter_type
Import_parameter_2	ParameterValue	Parameter_type
Table_1	Table_row_value	String
Table_1	Table_row_value	String
Table_1	Table_row_value	String
..	..	..
Table_2	Table_row_value	String
Table_2	Table_row_value	String
Table_2	Table_row_value	String
..	..	..

The `Parameter_type` of each BAPI/RFC function might not be the same type as the type of the corresponding FML field. FML conversion functions are used to perform data conversion upon reading or writing a fielded buffer. A table row can be a structure with a specific format, but the data type of each field of the structure should be defined as `string`.

Mapping of FML32 Response Buffer to R/3 Export Parameters and Tables

The response from the TUXEDO action will be encoded in the FML32 response buffer using the following fields:

Table 2-4 Mapping of FML32 Response Buffer to R/3 Export Parameters and Tables

FML32 Field Name	Field Value	Value Type
Export_parameter_1	Parameter_value	Parameter_type
Export_parameter_2	Parameter_value	Parameter_type
Table_2	Table_row_value	String
Table_2	Table_row_value	String
Table_2	Table_row_value	String
..	..	..
Table_3	Table_row_value	String
Table_3	Table_row_value	String
Table_3	Table_row_value	String
..	..	..

The `Parameter_type` of each BAPI/RFC function might not be the same type as the type of the corresponding FML field. FML conversion functions are used to perform data conversion upon reading or writing a fielded buffer. A table row can be a structure with a specific format, but the data type of each field of the structure should be defined as `string`.

Error Handling

This section describes how the RFC R/3 to eLink handles both adapter (non-TUXEDO) level errors and TUXEDO action invocation errors.

Error Logging

When the RFC R/3 to eLink encounters an infrastructure error, it may log the following to the TUXEDO userlog:

- The eLink error category
- An eLink Adapter for R/3 specific error code and text
- A unique code identifying where in the code the error was encountered

Adapter Error at Startup

All adapter level errors encountered during startup prevent RFC R/3 to eLink from starting and will be logged.

TUXEDO Action Invocation Error Handling

TUXEDO action `TPCALL` returns -1 on error and sets `tperrno` to indicate the error condition. The RFC R/3 to eLink connection raises exceptions to the calling ABAP application.

- **RFC R/3 to eLink Infrastructure Error -** If the error returned from TUXEDO action is an RFC R/3 to eLink infrastructure error, the exception defined in the environment variable `CR3_RFC_INFRASTRUCTURE_EXCEPT` is raised. If this environment variable is not specified, the application aborts.
- **Business Logic Error -** If the error returned from TUXEDO action is a business logic error, the exception defined in the environment variable `CR3_RFC_BUSINESS_EXCEPT` is raised. If this environment variable is not specified, the application aborts.

Infrastructure Error vs. Business Logic Error

Errors are classified into two categories: Infrastructure error and business error.

- **Business logic error** refers to the error that occurs at the application business logic level.
- **Infrastructure error** refers to the error that occurs at the adapter level or system level.

According to the error handling specified in the eLink Adapter Architecture Specification, when the business error occurs during `TPCALL`, the return value is set to -1, `tperror` is set to `TPESVCFAIL`, and the application defined value `tpurcode` is set to 0.

CHAPTER

3 Preinstallation Tasks

This topic describes important information that you need to review before installing BEA eLink Adapter for R/3 BAPI/RFC. It includes the following main sections:

- System Requirements
- Determining the Installation Node
- TUXEDO Requirements

System Requirements

This document is validated for the following versions of the layered products:

Table 3-1 Supported Platforms

Product	Version(s)
SAP R/3	3.1H and 4.5B
TUXEDO	6.5
HP-UX	10.20, 11.00
Solaris	2.6, 2.7
AIX	4.3
Windows NT	4.0 (Service Pack 4)

Determining the Installation Node

Where you install eLink Adapter for R/3 ALE depends on the node configuration:

- **Single Node**. If the R/3 environment is a single node configuration, then you should install BEA eLink Adapter for R/3 BAPI/RFC on that node.
- **Multiple Nodes**. If the R/3 environment is a multiple node configuration, then you should install BEA eLink Adapter for R/3 BAPI/RFC on one or more of the application servers. BEA eLink Adapter for R/3 BAPI/RFC must *not* be installed on the database server.

BEA eLink Adapter for R/3 BAPI/RFC interacts with R/3 using the SAP RFC library. The RFC library uses IP sockets to communicate with the R/3 application servers. Installing BEA eLink Adapter for R/3 BAPI/RFC on an R/3 application server node minimizes the risk of failure in this IP socket connection. If BEA eLink Adapter for R/3 BAPI/RFC is installed on an R/3 application server node, it is recommended that no other TUXEDO applications run on that same node, in order to reduce the workload on the node.

However, BEA eLink Adapter for R/3 BAPI/RFC can be installed on a node other than an R/3 application server. In this situation, the IP socket connection will transparently extend across the network to the R/3 application server.

TUXEDO Requirements

BEA eLink Adapter for R/3 BAPI/RFC requires that you properly install and configure TUXEDO:

- **Installation Node**. TUXEDO must be installed on the node running BEA eLink Adapter for R/3 BAPI/RFC. For installation instructions, see the *BEA TUXEDO Administrator's Guide* for your platform.
- **TUXEDO Configuration**. After you install BEA eLink Adapter for R/3 BAPI/RFC, you must configure TUXEDO according to the instructions described in Chapter 5, “TUXEDO Initialization File.” BEA eLink Adapter for R/3 BAPI/RFC provides a semi-configured TUXEDO initialization file, which requires only minimal configuration for the TUXEDO environment.

CHAPTER

4 Installing BEA eLink Adapter for R/3 BAPI/RFC

This section describes how to install BEA eLink Adapter for R/3 BAPI/RFC on UNIX and Windows NT systems. It covers the following main topics:

- Installing on a UNIX System
- Installing on a Windows NT System

Installing on a UNIX System

Installing eLink Adapter for R/3 BAPI/RFC on UNIX systems requires the three main steps:

- Creating the conr3 User
- Logging In as con3
- Running install.sh

Creating the conr3 User

A UNIX user with non-administrative privileges should be created on the R/3 application server to provide a context in which to run both TUXEDO and BEA eLink Adapter for R/3 BAPI/RFC. This user should be used to run TUXEDO and BEA eLink Adapter for R/3 BAPI/RFC *only* so that processes associated with TUXEDO and BEA eLink Adapter for R/3 BAPI/RFC can be identified easily.

BEA suggests that you use `conr3` for the user name. This document refers to this UNIX user as `conr3`. If your organization uses a different user name, then substitute your user name whenever you encounter a reference to `conr3` in this document.

Note: BEA strongly recommends that you do *not* use the UNIX R/3 administration user (*nnn*adm, where *nnn* represents the R/3 system identifier) to run TUXEDO and BEA eLink Adapter for R/3 BAPI/RFC.

Logging In as con3

After creating the `conr3` user name, log in as that user.

Running install.sh

Run the `install.sh` script to install the BEA eLink Adapter for R/3:

1. Insert the CD-ROM in the CD-ROM drive.

   If your system is not already configured to access data from a CD-ROM directory, you will need to create a mount directory (for example, `mkdir /cdrom`) and mount the CD-ROM device (with the `mount` command).

   Change directories to your CD-ROM directory using the following command:

   ```
   cd /cdrom
   ```

2. Type `ls` to view the contents of the CD.

   The CD should contain the following files and directories:

   ```
   HPUX/   IBM/   install.sh   readme.txt   SUN5X/   WINNT/
   ```

3. Start the installation by typing the following at the command line prompt:

   ```
   sh ./install.sh
   ```

   Press **Enter**.

   This invokes the installation script.

   The UNIX system installation script provides a set of step-by-step instructions to help you quickly install the BEA eLink Adapter for R/3. This script lets you specify your platform, operating system, and the directory where you want to install. The installation script prompts you through the entire installation process. You can cancel the installation at any time by pressing `CTRL-C` simultaneously.

4. Type the number that corresponds to the name of the operating system you are using (for example, if using HPUX1020, type `1`).

   ```
   01) HP/HPUX1020    02) HP/HPUX1100      03) IBM/AIX414
   04) IBM/AIX421     05) IBM/AIX43        06) SUN5X/SOL251
   07) SUN5X/SOL26

   Install which platform's files? [01-5, q to quit, l for list]: 2
   ```

   Press **Enter**.

5. You are prompted to confirm your choice. If correct, type `y` for "yes," or `n` for "no" or `q` to "quit." Press **Enter**.

   ```
   ** You have chosen to install from HP/HPUX1100 **

   BEA eLink Adapter for R/3 BAPI/RFC Release 1.5

   This directory contains the BEA eLink Adapter for R/3 BAPI/RFC
   for HP-UX 11.00 on 9000/800 series.

   Is this correct? [y,n,q]: y
   ```

6. The script indicates which packages are available for the chosen operating system. Indicate which package to install and press **Enter**.

   ```
   The following packages are available:

   1  eLinkR3BAPI  BEA eLink Adapter for R/3 BAPI/RFC

   Select the package(s) you wish to install (or 'all' to install

   all packages) (default: all) [?,??,q]: 1
   ```

   The following copyright information is displayed about the product you are about to install:

   ```
   BEA eLink Adapter for R/3 Release BEA eLink Adapter for R/3
   BAPI/RFC Release 1.5
   ```

```
Copyright (c) 1999 BEA Systems, Inc.
All Rights Reserved.
Distributed under license by BEA Systems, Inc.
BEA and eLink are trademarks of BEA Systems, Inc.
```

7. You are prompted for the directory location where you want to install the product. Type the install directory and press **Enter**.

   Note: It is recommended that you install BEA eLink Adapter for R3 under a directory named `eLink`. The host machine where you install and the prefix path to the `eLink` directory is up to you. For this example, we install on `/home/miller/eLink/`.

```
Directory where eLink files are to be installed [?,q]:
/home/miller/eLink
```

8. Watch the screen messages to verify that the installation is successful. The messages will be similar to the following.

```
Creating /home/miller/elink
Using /home/miller/elink as the eLink base directory
Creating /home/miller/elink/adapters
Creating /home/miller/elink/adapters/sapr3_bapi
Determining if sufficient space is available ...
5310 blocks are required
720598 blocks are available to
/home/miller/eLink/adapters/sapr3_bapi
Using /home/miller/elink/adapters/sapr3_bapi
as the eLink Adapter for R/3 install directory
Unloading /cdrom/HP/HPUX1100/ELINKR3/ELINKR3.Z ...
bin/cr3rfcin
bin/cr3rfcout
config/cr3_tlog.sh
config/setenv.sh
config/cr3rfcin.env
config/cr3rfcout.env
config/cr3_bapi.ubb
```

```
config/cr3_bapi.fml

config/sideinfo

5310 blocks

... finished

Installation of BEA eLink Adapter for R/3 BAPI/RFC was successful

The following packages are available:

  1  eLinkR3BAPI  BEA eLink Adapter for R/3 BAPI/RFC
```

9. When the installation completes successfully, exit the install script. (Or proceed with another installation, as appropriate.)

```
Select the package(s) you wish to install (or 'all' to install

all packages) (default: all) [?,??,q]: q

Please don't forget to fill out and send in your registration
card #
```

Table 4-1 describes the files and directories that are installed for BEA eLink Adapter for R3 on a UNIX system.

Table 4-1 Directory Structure of BEA eLink Adapter for R/3 BAPI/RFC on a UNIX System

File or Directory Name	Description
`bin/cr3rfcin`	BAPI/RFC eLink to R/3 executable
`bin/cr3rfcout`	RFC R/3 to eLink executable
`config/cr3_tlog.sh`	Semi-configured startup script for log files
`config/setenv.sh`	Semi-configured setup file for generic eLink for R/3 environment variables
`config/cr3rfcin.env`	Environment file for BAPI/RFC eLink to R/3
`config/cr3rfcout.env`	Environment file for RFC R/3 to eLink
`config/cr3_bapi.ubb`	TUXEDO UBB configuration file
`config/cr3_bapi.fml`	CR3 FML field table
`config/signify`	Example R/3 sideinfo file

Installing on a Windows NT System

The BEA eLink Adapter for R/3 product install program for the Windows NT platform is located in the `winnt\setup.exe` file on the CD-ROM.

To install the product, insert the CD into the CD-ROM drive and double click on the `winnt\setup.exe` file to launch the installation wizard.

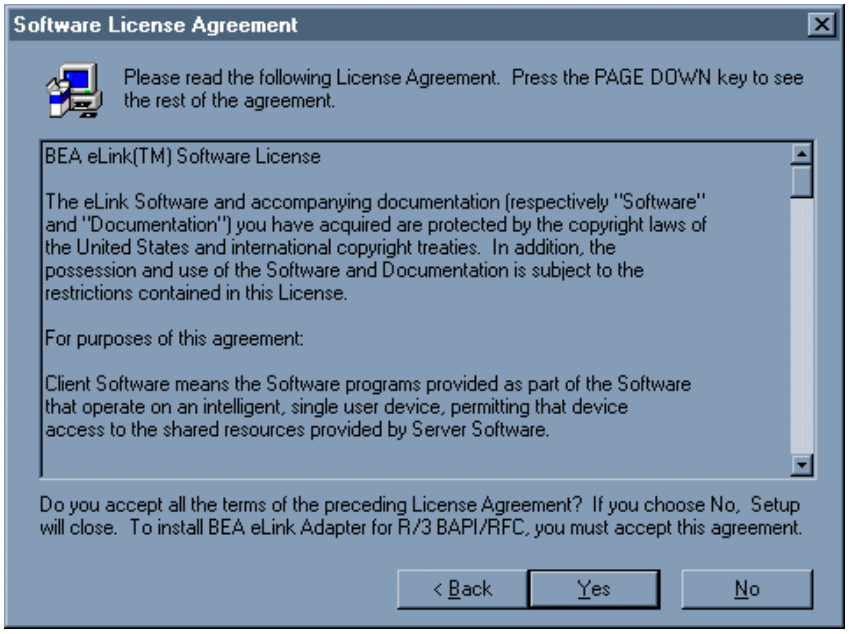
When the installation program launches, follow the prompts shown in the windows as described.

1. The Welcome window describes the product you are about to install. Click **Next** to continue (or click **Cancel** to cancel the installation process).

Figure 4-1 Welcome to BEA eLink Adapter for R3 Setup Program

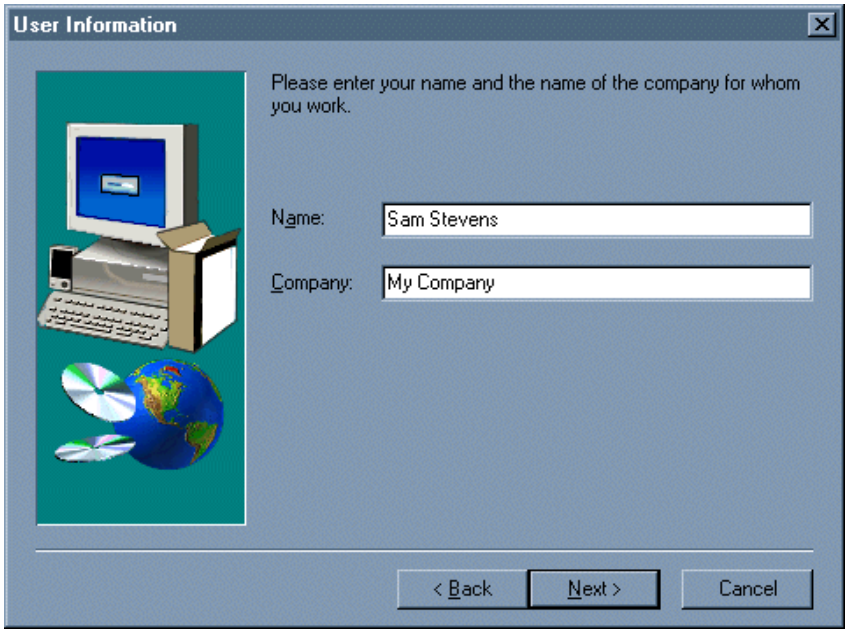
2. In order to proceed with the installation, you must accept the license agreement. Click **Yes** to accept (or click **No** to cancel the installation process).

Figure 4-2 License Agreement



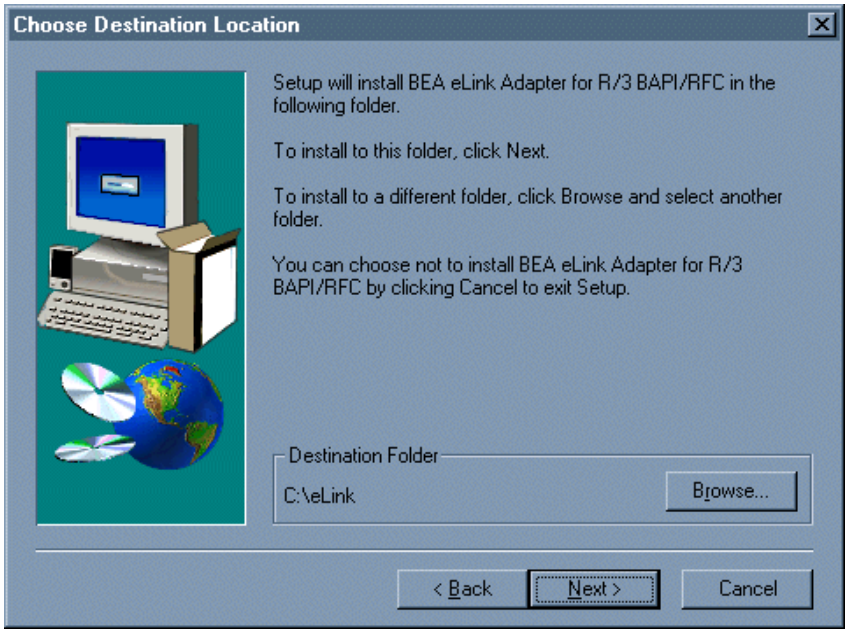
3. After you accept the license agreement, the User Information window is displayed. Provide the requested information, and click **Next** to continue (or **Back** to return to a previous window).

Figure 4-3 Provide User Information



4. The path shown for the "Destination Folder" on the Choose Destination Location window is the location where the BEA eLink product(s) will be installed. The default Destination Folder is *`YourDrive`*`:\eLink\` as shown in Figure 4-4. To accept the default, click **Next** to continue. Otherwise, use the file browser to choose a different destination folder as explained below.

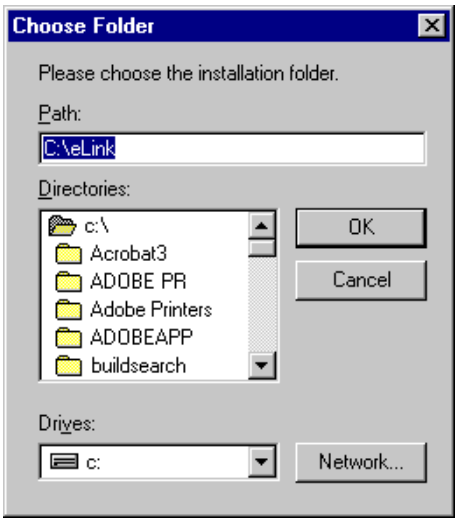
Figure 4-4 Choose Directory Location for Product Installation



If you want to install the BEA eLink product in a folder other than the default, click the **Browse** button to get the file browser. Use the file browser to locate the directory in which you want to install the BEA eLink product and click **OK** to specify this new path name as the Destination Folder.

Note: It is recommended that you install BEA eLink Adapter for R/3 under a directory named `eLink`. The host machine where you install and the prefix path to the `eLink` directory is up to you. For this example, we install on `C:\eLink\`.

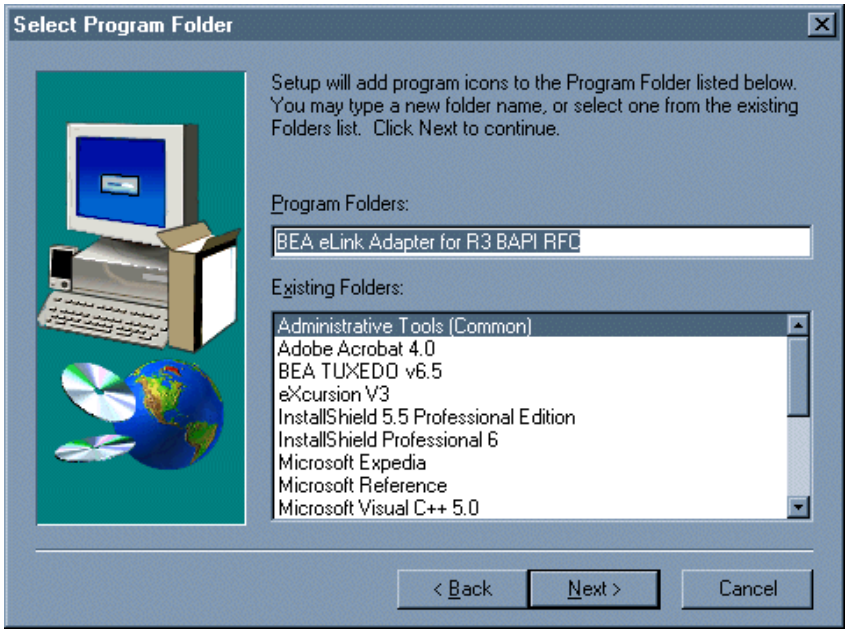
Figure 4-5 File Browser for Choosing an Install Location



If you do change the Destination Folder to something other than the default, you should now see the new path name reflected in the Choose Folder window.

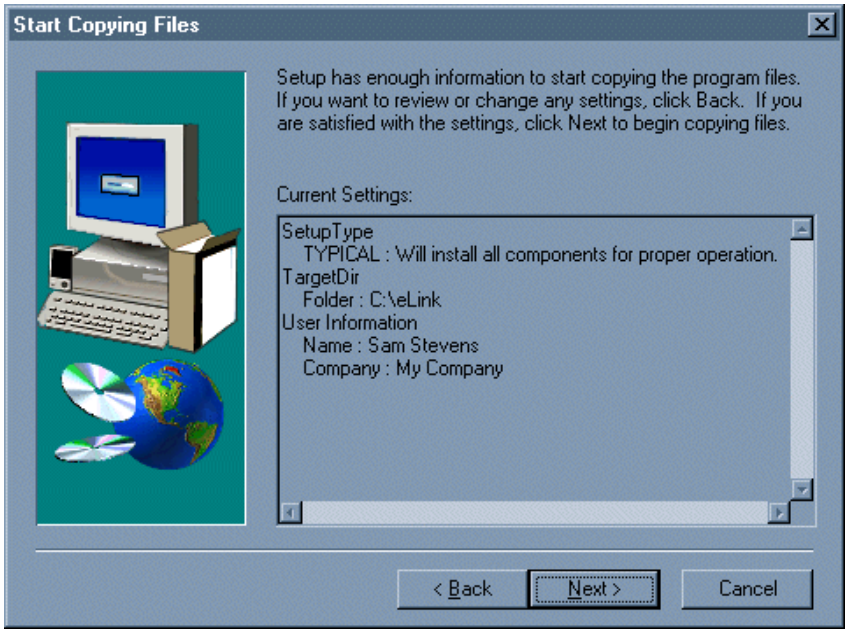
5. Select the program folder where you want to store the startup icon for the BEA eLink Adapter for R3 product. The default folder is already chosen for you. If you want to choose a different folder, do so. Click **Next** to continue (or **Back** to return to a previous window).

Figure 4-6 Select a Program Folder



6. If you are satisfied with the current settings, click **Next** to proceed with the installation. (Otherwise, click **Back** to return to a previous window.)

Figure 4-7 Current Settings



7. When all files have been successfully copied to the destination folders, the Setup Complete window is displayed. Click **Finish** to exit the installation.

Figure 4-8 Setup Complete

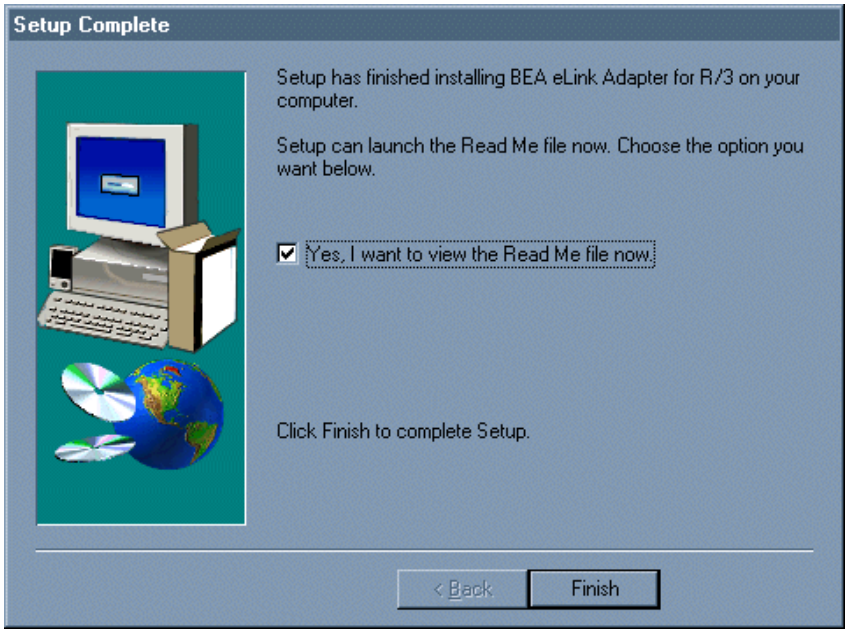


Table 4-2 describes the files and folders that are installed for BEA eLink Adapter for R3 on a Windows NT system.

Table 4-2 Directory Structure of BEA eLink Adapter for R/3 BAPI/RFC on Windows NT

File or Folder Name	Description
`eLink\bin\`	Directory containing executables
`eLink\bin\cr3alein.exe`	ALE eLink to R/3 executable
`eLink\bin\cr3aleout.exe`	ALE R/3 to eLink executable
`eLink\bin\cr3rfcin.env`	Environment file for RFC eLink to R/3
`eLink\bin\cr3tidmanager.exe`	TID manager executable
`elink\bin\librfc.dll`	R/3 RFC Dynamic Link Library
`eLink\config`	Directory containing configuration files

Table 4-2 Directory Structure of BEA eLink Adapter for R/3 BAPI/RFC on Windows NT

File or Folder Name	Description
`eLink\config\cr3_queues.nt`	Semi-configured startup script for queues
`eLink\config\cr3_tlog.bat`	Semi-configured startup script for log files
`eLink\config\setenv.bat`	Semi-configured setup file for generic eLink for R3 environment variables
`eLink\config\cr3aleout.bat`	Semi-configured startup script for ALE R/3 to eLink
`eLink\config\cr3alein.env`	Environment file for ALE eLink to R/3
`eLink\config\cr3rfcin.exe`	RFC eLink to R/3 executable
`eLink\config\cr3.ubb`	TUXEDO UBB configuration file
`eLink\config\cr3_bapi.fml`	CR3 FML field table
`eLink\config\sideinfo`	Example R/3 sideinfo file

CHAPTER

5 TUXEDO Initialization File

BEA eLink Adapter for R/3 BAPI/RFC requires some configuration of the TUXEDO initialization file. For configuration instructions, see the *BEA TUXEDO Administrator's Guide* for your platform.

BEA eLink Adapter for R/3 BAPI/RFC provides a semi-configured TUXEDO initialization file, `cr3_bapi.ubb`, in the config sub-directory of the BEA eLink Adapter for R/3 BAPI/RFC installation directory. This `cr3_bapi.ubb` file is configured for the BEA eLink Adapter for R/3 BAPI/RFC servers and it requires further configuration for integration into the global TUXEDO environment. For example, in the GROUPS section of your UBB file, you must define the server group to which the BAPI/RFC eLink to R/3 belongs, such as CR3. See Appendix A, "Sample cr3_bapi.ubb File," for a listing of this file.

Note: BAPI/RFC eLink to R/3 and RFC R/3 to eLink use TUXEDO transactions. For these components, you need to create a transaction log (TLOG) using TUXEDO administrative tools. See the *BEA TUXEDO Administrator's Guide* for your platform.

CHAPTER

6 Configuring BAPI/RFC Integration

This topic describes how to configure your BEA eLink Adapter for R/3 BAPI/RFC installation for integration with SAP's Remote Function Call (RFC) / Business Application Programming Interface (BAPI) technology. It includes the following main sections:

- Configuring the BAPI/RFC eLink to R/3 Server
- Configuring the RFC R/3 to eLink Server

Using BEA eLink Adapter for R/3 BAPI/RFC, TUXEDO applications can invoke BAPI/RFC-enabled ABAP/4 functions on R/3 systems, and R/3 can act as a TUXEDO server and invoke TUXEDO services. For more information about BAPI/RFC integration, see Chapter 2, "Integrating with BAPIs/RFCs," in this guide.

Note: You need to complete the tasks in this section *only* if you require application integration with BAPI/RFC technology.

Configuring the BAPI/RFC eLink to R/3 Server

This topic describes how to configure the BAPI/RFC eLink to R/3 server. It includes the following main sections:

- Configuring the eLink to R/3 Connection for BAPI/RFC eLink to R/3
- Setting Environment Variables for BAPI/RFC eLink to R/3

BAPI/RFC eLink to R/3 is a standard TUXEDO server that is defined in the TUXEDO configuration file.

Configuring the eLink to R/3 Connection for BAPI/RFC eLink to R/3

You must configure the eLink to R/3 connection for BAPI/RFC eLink to R/3, including the `sideinfo` file and environment variables. For more information, see "Configuring eLink to R/3 Connections" in Chapter 7, "Configuring R/3 Connections."

BAPI Configuration Requirements

The BAPI/RFC servers interrogate the R/3 system to determine the version and then set internal configuration parameters accordingly.

The servers are configured via an environment file. A BAPI configuration is the identical to RFC configuration.

Configuring the UBB File for BAPI/RFC eLink to R/3

BAPI/RFC eLink to R/3 is a standard TUXEDO server that is defined in the UBB file. You must configure this file to specify the server group, server, environment file, and services associated with the BAPI/RFC eLink to R/3 server. See Appendix A, "Sample cr3_bapi.ubb File," for a listing of the sample UBB file that comes with BEA eLink Adapter for R/3 BAPI/RFC.

Defining the Server Group

In the SERVERS section of your UBB file, you must first define the server group (such as CR3) to which BAPI/RFC eLink to R/3 belongs. See "TUXEDO Initialization File" in Chapter 5, "TUXEDO Initialization File," for instructions.

Defining the BAPI/RFC eLink to R/3 Server

In the SERVERS section of your UBB file, you must define the BAPI/RFC eLink to R/3 server, specifying its server group, server ID, and environment file using the following syntax:

```
SRVGRP=GroupId SRVID=ServerID
CLOPT = " -- -i unique_id -e env_filename"
```

where:

- *GroupID* is the unique ID of the server group to which the BAPI/RFC eLink to R/3 server belongs.
- *ServerID* is the unique ID of the BAPI/RFC eLink to R/3 server.
- -i *unique_id* is the unique ID that identifies the label section in the environment file containing the adapter's environment variables. You would use this value when you run multiple eLink adapters (for example, BAPI/RFC eLink to R/3 and RFC R/3 to eLink) that share this configuration file. If it is not specified, then the unique ID defaults to the process name.
- -e *env_filename* is the environment file that specifies the detailed configuration information.

Listing 6-1 shows SERVERS settings for RFC eLink to R/3 in a sample UBB file for Windows NT:

Listing 6-1 Sample SERVERS Settings for BAPI/RFC eLink to R/3 Server

```
###############################################################
*SERVERS
###############################################################
cr3rfcin
     SRVGRP=CR3 SRVID=4
     CLOPT="-o cr3rfcin.log -- -i cr3rfcin -e cr3.env"
```

Defining the BAPI/RFC eLink to R/3 Service

In the SERVICES section of your UBB file, you must define the CR3_RFC_IN service. Listing 6-2 shows SERVICES settings for BAPI/RFC eLink to R/3 in a sample UBB file for Windows NT:

Listing 6-2 Sample SERVICES Settings for BAPI/RFC eLink to R/3 Server

```
###############################################################
*SERVICES
###############################################################
CR3_RFC_IN
```

Setting Environment Variables for BAPI/RFC eLink to R/3

The BAPI/RFC eLink to R/3 server requires particular environment variables that specify connection information to R/3 and the behavior of the server. These environment variables are defined in an environment file that is specified in the TUXEDO initialization file as the ENVFILE parameter for the server.

BEA eLink Adapter for R/3 BAPI/RFC provides a semi-configured TUXEDO environment file (cr3rfcin.env) for use with the BAPI/RFC eLink to R/3 server. There should a separate environment file specified in the `cr3_bapi.ubb` configuration for each BAPI/RFC eLink to R/3 server. See Appendix A, “Sample cr3_bapi.ubb File,” for more information.

Environment Variables

You can configure the following environment variables for the BAPI/RFC eLink to R/3 server:

Table 6-1 Environment Variables for the BAPI/RFC eLink to R/3 Server

Task / Variable	Value	Description
Adapter Label Section		
[SERVER=*AdapterID*]	Adapter ID	Defines the label section containing the adapter environment variables. The unique *AdapterID* is the value of the –i flag on the CLOPT line in the UBB file. If not specified, then the default value is the process name. *Required*.
Connecting to R/3		
`CR3_DESTINATION`	System Name	The destination switch in the `sideinfo` file that defines the R/3 application server for connection. Default is undefined. *Required*.
`CR3_CLIENT`	Client Number	R/3 login client number. Default is undefined. *Required*.
`CR3_USER`	User	R/3 login user. Default is undefined. The user must be of type CPIC. *Required*.
`CR3_PASSWORD`	Password	R/3 login user password. Default is undefined. *Required*.
`CR3_LANGUAGE`	Language	R/3 login language. Default is E for English. *Required*.
`SIDE_INFO`	Path and File	Full path to the `sideinfo` file, which defines the R/3 connection information that is used by the BAPI/RFC library. If not specified, then the sideinfo file must reside in the same directory as the BAPI/RFC eLink to R/3 executable. *Optional.*

Table 6-1 Environment Variables for the BAPI/RFC eLink to R/3 Server

Task / Variable	Value	Description
CR3_EXIT_R3_CONNECT_LOSS	Y or N	If set to Y, BAPI/RFC eLink to R/3 exits when it detects that it has lost the BAPI/RFC connection to R/3. If set to N or unspecified, then BAPI/RFC eLink to R/3 does not exit but instead tries to restore the connection upon the next service call. *Optional.*
Response Buffer Size		
CR3_RESPONSE_BUFFER_SIZE	Size (bytes)	Defines the starting size of the FML32 response buffer. If not specified, then the default starting size is 10,000 bytes. *Optional.*
Defining Callable BAPIs/RFCs		
SERVICE_LIST	List of services to be advertised	Comma-delimited list containing the names of TUXEDO services that BAPI/RFC eLink to R/3 advertises. *Required*.
[SERVICE=*Service Name*]	Service name	Service name for each service in the SERVICES_LIST environment variable. Signifies the start of the service configuration definition. *Required*.
CR3_RFC_NAME	BAPI/RFC Name	Name of the ABAP/4 function to execute when the associated service is invoked. *Required*.
CR3_EXPORT_PARAMS	Export parameters to be returned	Comma-delimited list containing the names of the BAPI/RFC's export parameters to be returned in the FML32 response buffer. *Optional*.
CR3_EXPORT_TABLES	Export tables to be returned	Comma-delimited list containing the names of the BAPI/RFC's export tables to be returned in the FML32 response buffer. *Optional*.

Table 6-1 Environment Variables for the BAPI/RFC eLink to R/3 Server

Task / Variable	Value	Description
Logging		
CR3_TRACE	Y or N	If set to Y, then BAPI/RFC eLink to R/3 logs detailed tracing information during processing. If set to N or unspecified, BAPI/RFC eLink to R/3 does not log trace information. *Optional*.

Sample Environment File (cr3rfcin.env)

Listing 6-3 shows the settings for the sample `cr3rfcin.env` file:

Listing 6-3 Sample Environment File

```
CR3_DESTINATION=<R/3 System Name>
CR3_CLIENT=<R/3 Client ID>
CR3_USER=<R/3 User>
CR3_PASSWORD=<R/3 Password>
CR3_LANGUAGE=E
SIDE_INFO=<your eLink app directory>\sideinfo
CR3_EXIT_R3_CONNECT_LOSS=N
CR3_TRACE=Y
SERVICES_LIST=service_1,service_2,service_3
[SERVICE=service_1]
CR3_RFC_NAME=RFCName1
CR3_EXPORT_PARAMS=ExportParam1,ExportParam2
CR3_EXPORT_TABLES=ExportTable1
[SERVICE=service_2]
CR3_RFC_NAME=RFCName2
CR3_EXPORT_PARAMS=ExportParam1,ExportParam2
CR3_EXPORT_TABLES=ExportTable1
[SERVICE=service_3]
CR3_RFC_NAME=RFCName3
CR3_EXPORT_PARAMS=ExportParam1,ExportParam2
CR3_EXPORT_TABLES=ExportTable1
```

Specifying the Adapter Label

You can specify an optional adapter label in the environment file to define a label section containing the adapter's environment variables. You use this label when you run multiple eLink adapters (for example, BAPI/RFC eLink to R/3 and RFC R/3 to eLink) that share this configuration file. The unique *AdapterID* corresponds to the value of the –i flag on the CLOPT line in the UBB file. See "Defining the BAPI/RFC eLink to R/3 Server" on page 6-3 for more information.

Setting Up the eLink to R/3 Connection to R/3

To set up the eLink to R/3 connection to R/3, you must set environment variables and configure the sideinfo file. See "Configuring eLink to R/3 Connections" in Chapter 7, "Configuring R/3 Connections" for more information.

Exiting if the Connection is Lost

You can configure BAPI/RFC eLink to R/3 to exit if it detects a lost connection to R/3 by setting the CR3_EXIT_R3_CONNECT_LOSS environment variable to Y, as shown in the following example:

```
CR3_EXIT_R3_CONNECT_LOSS=Y
```

If you do not specify this environment variable or if you set it to N, then BAPI/RFC eLink to R/3 will try to restore the connection to R/3 instead upon the next service call.

Specifying the Initial Size of the Response Buffer

You can configure the initial size, in bytes, of the response buffer that BAPI/RFC eLink to R/3 allocates for exported parameters by setting the CR3_RESPONSE_BUFFER_SIZE environment variable, as shown in the following example:

```
CR3_RESPONSE_BUFFER_SIZE=15000
```

If you do not specify this environment variable, BAPI/RFC eLink to R/3 sets the initial size of the response buffer to 10,000 bytes. You increase this buffer size to improve performance for BAPI/RFC calls that return very large volumes of data.

Configuring BAPI/RFC

To execute an ABAP/4 function on R/3, the calling application prepares an FML32 request buffer that contains the applicable RFC import parameters and import tables. The calling application invokes the TUXEDO service associated with the BAPI/RFC, passing in the request buffer. BAPI/RFC eLink to R/3 makes the remote function call on R/3, passing the import parameters to R/3. BAPI/RFC eLink to R/3 receives the results and returns them in an FML32 response buffer to the calling application. You configure environment variables to control this process.

For each ABAP/4 function that you want to execute remotely using BAPI/RFC eLink to R/3, you must specify a label in the environment file that identifies the name of the TUXEDO service associated with this BAPI/RFC ([SERVICE=*ServiceName*]). For each service, you must specify the following attributes (in environment variables):

- Name of the BAPI/RFC to execute when this service is invoked (CR3_RFC_NAME).
- Export parameters, if any, to return in the FML32 response buffer (CR3_EXPORT_PARAMS).
- Export tables, if any, to return in the FML32 response buffer (CR3_EXPORT_TABLES).

In addition, you must specify a list of all services to be advertised to calling applications (SERVICES_LIST). BAPI/RFC eLink to R/3 reads and processes this list, and then advertises the service names, aliasing them to the CR3_RFC_IN service.

Defining the List of Services to Advertise

You must specify the list of services (a comma-delimited series) that BAPI/RFC eLink to R/3 advertises in the SERVICES_LIST environment variable, as shown in the following example:

```
SERVICES_LIST=service_1,service_2,service_3
```

Defining Each Advertised Service

For each service specified in the SERVICES_LIST, you must specify a service label and define the name of the BAPI/RFC to execute as well as the contents of the FML32 response buffer (export parameters and export tables) that you want BAPI/RFC eLink to R/3 to return to the calling application, as shown in the following example:

```
[SERVICE=service_1]
CR3_RFC_NAME=RFCName1
CR3_EXPORT_PARAMS=ExportParam1,ExportParam2
CR3_EXPORT_TABLES=ExportTable1
```

Note: It is the developer's responsibility to ensure that the names of export parameters and export tables are spelled exactly as they appear in the ABAP/4 function definition.

Configuring Trace Output to the BAPI/RFC eLink to R/3 Log

You can configure BAPI/RFC eLink to R/3 to write detailed trace information to the log by setting the CR3_TRACE environment variable to Y, as shown in the following example:

```
CR3_TRACE=Y
```

If you set this to N or do not specify it, BAPI/RFC eLink to R/3 writes no trace information to the log.

You can redirect stdout by changing the value of the –o flag on the CLOPT line in the UBB file. See "Defining the BAPI/RFC eLink to R/3 Server" on page 6-3 for more information.

Operational Requirements

At run-time, the BAPI/RFC servers use the appropriate RFC structures to interface with R/3. These structures are version specific.

Once configured for a specific version of R/3, the BAPI/RFC servers will use the appropriate structures and functions. No further interrogation of R/3 will be necessary.

BAPI/RFC Interface

Each BAPI/RFC name defined in R/3 must have a corresponding TUXEDO service name defined in the environment file.

Each BAPI/RFC in R/3 defines a set of import parameters, export parameters, and tables. Each of the defined import parameters, export parameters, and tables must be supplied to the eLink to R/3 server. These values must be provided in the FML32 buffer passed into the eLink to R/3 server. Each field name in the FML buffer must directly map to the R/3 interface parameters for a particular BAPI/RFC.

R/3 tables and fields are specifically defined by a named FML field. Each table field is mapped to an FML field occurrence as outlined in later sections.

Import Parameter

For import parameters, there is one to one mapping between an R/3 parameter and an FML field name. Each parameter is supplied by one FML field containing the data value.

Table 6-2 Import Parameter

R/3 Parameter Name	FML Field Name	Data
P1	P1	value
P2	P2	value
...	...	...
Pn	Pn	value

Export Parameter

For export parameters, there is a one to one mapping between an R/3 parameter and an FML field name. Each parameter is supplied by one FML field containing the data value.

Table 6-3 Export Parameter

R/3 Parameter Name	FML Field Name	Data
P1	P1	value
P2	P2	value
...	...	...

R/3 Parameter Name	FML Field Name	Data
Pn	Pn	value

Import Table

For import tables, there is a one to one mapping between an R/3 table field and an FML field occurrence. Each table field is supplied by one FML field occurrence containing the data value.

The FML field name consists of the table name concatenated with the field name. You must provide a user-defined concatenation string. The default concatenation string is "_".

Table 6-4 Import Table

R/3 Table Field Name Table T1	FML Field Name	FML Occurrence	Data
F1	T1_F1	0	value
F1	T1_F1	1	value
...	...	...	...
F1	T1_F1	n	value
F2	T1_F2	0	value
F2	T1_F2	1	value
...	...	...	...
F2	T1_F2	n	value
F3	T1_F3	0	value
F3	T1_F3	1	value
...	...	...	...
F3	T1_F3	n	value

Export Table

For export tables, there is a one to one mapping between an R/3 table field and an FML field occurrence. Each table field is supplied by one FML field occurrence containing the data value.

The FML field name consists of the table name concatenated with the field name. You must provide a user-defined concatenation string. The default concatenation string is "_".

Table 6-5 Export Table

R/3 Table Field Name Table T1	FML Field Name	FML Occurrence	Data
F1	T1_F1	0	value
F1	T1_F1	1	value
...	...	...	...
F1	T1_F1	n	value
F2	T1_F2	0	value
F2	T1_F2	1	value
...	...	...	...
F2	T1_F2	n	value
F3	T1_F3	0	value
F3	T1_F3	1	value
...	...	...	...
F3	T1_F3	n	value

Datatype Conversion

Data coming from R/3 is converted into a corresponding FML datatype. Similarly, data coming from eLink is converted into a corresponding R/3 datatype.

Table 6-6 Datatype Conversion

R/3 Datatype	FML Datatype
TYPC	string
TYPDATE	string
TYPP	string
TYPTIME	string
TYPX	carray
TYPNUM	int
TYPFLOAT	float
TYPINT	int

Licensing

The eLink adapter for R/3 BAPI/RFC requires the following licenses:

- eLink Platform 1.1
- eLink Adapter for R/3 BAPI/RFC 1.5

Configuring the RFC R/3 to eLink Server

The RFC R/3 to eLink is a TUXEDO server. Configuration is required in the TUXEDO UBB file to run the RFC R/3 to eLink server within the TUXEDO domain. An environment file will define detailed configuration information required by the RFC R/3 to eLink.

SAP R/3 Connection Requirements

The RFC R/3 to eLink will register with R/3 using the registration functionality of the BAPI/RFC API.

UBB File Configuration Requirements

At a minimum, the RFC R/3 to eLink will require the following configuration in the UBB file:

```
cr3rfcout
        SRVGRP=.. SRVID=..
        CLOPT = " -- -i unique_id -e env_filename"
```

where `-i unique_id`

is the unique ID identifying the label section in the environment file containing the adapter environment variables. This parameter is optional. If it is not specified, then the unique id will default to the process name.

```
        -e env_filename
```

is the environment file specifying the detailed configuration information.

Environment File Configuration Requirements

The detailed configuration information for the RFC R/3 to eLink is specified in an environment file. The configuration information is grouped into the following tables. Users must provide server connection variables, client connection variables, generic configuration variables, and some additional variables based on different TUXEDO actions.

The environment variables for an adapter can be specified in an environment file individually or as part of a combined environment file with environment variables for other adapters. See the "Description" for the [SERVER=..] adapter unique ID variable in Table 5-7 for more information.

Adapter Unique ID Variable

You can configure the following adapter unique ID variable for the RFC R/3 to eLink server:

Table 6-7 Adapter Unique ID Variable for the RFC R/3 to eLink Server

Task / Variable	Value	Description
[SERVER=..]	String The adapter unique ID will either be the value of the -i flag on the CLOPT line, or if not specified, then the default value of the process name.	Adapter unique id. The label section defines all the environment variables for this adapter with this adapter unique id. If the environment file specifies environment variables for more than one adapter, the [SERVER=..] environment variable must be presented to distinguish the environment variables for this adapter with this adapter unique id from the environment variables for other adapters.

Server Connection Variables

You can configure the following server connection variables for the RFC R/3 to eLink server:

Table 6-8 Server Connection Variables for the RFC R/3 to eLink Server

Task / Variable	Value	Description
CR3_HOST	String	Destination switch in the sideinfo file
CR3_SOCKET	String	R/3 socket
CR3_PROGRAM_ID	String	R/3 program ID

Client Connection Variables

You can configure the following client connection variables for the RFC R/3 to eLink server:

Table 6-9 Client Connection Variables for the RFC R/3 to eLink Server

Task / Variable	Value	Description
CR3_DESTINATION	String	Destination switch in the sideinfo file
CR3_CLIENT	String	R/3 client
CR3_USER	String	R/3 user
CR3_PASSWORD	String	R/3 password
CR3_LANGUAGE	String	R/3 logon language
SIDE_INFO	String	Path and file name of sideinfo file. This file defines the R/3 connection information that is used by the BAPI/RFC library. Note: The RFC R/3 to eLink will not read this environment variable; it is read by the BAPI/RFC library — it is documented here for completeness only.

Generic Configuration Variables

You can configure the following generic configuration variables for the RFC R/3 to eLink server:

Table 6-10 Generic Configuration Variables for the RFC R/3 to eLink Server

Task / Variable	Value	Description
CR3_EXIT_R3_CONNECT_LOSS	Y or N	Specifies whether the RFC R/3 to eLink is to exit when it detects that it has lost the BAPI/RFC connection to R/3. If not specified or defined as a value other than Y, then the RFC R/3 to eLink will not exit upon losing the BAPI/RFC connection and will try to restore it.
CR3_CONNECT_RETRY_ATTEMPTS	Number	Number of connection retry attempts. If the RFC R/3 to eLink is not to exit when it detects that it has lost the BAPI/RFC connection to R/3 but to try to re-open the connection, then specifies the number of re-try attempts for every connection loss. If after this number of connection re-try attempts, the connection is still not opened, the RFC R/3 to eLink exits.
CR3_REQUEST_BUFFER_SIZE	Number with minimum 1	Number of bytes for the starting size of the FML32 request buffer.
CR3_TRACE	Y or N	Defines if trace output will be produced. If not specified or defined as a value other than Y, then no trace output will be produced.
CR3_RFC_NAMES	String	List of BAPI/RFC functions to be installed. Defines BAPI/RFC functions that the RFC R/3 to eLink will install and support. The function names will be specified as a list, which is comma delimited: function1, function2, function3, ...

Table 6-10 Generic Configuration Variables for the RFC R/3 to eLink Server

Task / Variable	Value	Description
[CR3_RFC_NAME=..]	String	BAPI/RFC function name. For each BAPI/RFC function in the list defined by the CR3_RFC_NAMES environment variables, a label will exist where the label is the BAPI/RFC function name. For each BAPI/RFC function, the label section will contain the CR3_TUX_ACTION environment variable and some additional variables. For example: CR3_RFC_NAMES=f1, f2, f3 [CR3_RFC_NAME=f1] ..... [CR3_RFC_NAME=f2] ..... [CR3_RFC_NAME=f3] .....
CR3_RFC_INFRASTRUCTURE_EXCEPT	String	The name of the BAPI/RFC function exception, which is used to raise adapter infrastructure-related exception. If this environment variable is not specified when a infrastructure-related error occurs, the application will abort.
CR3_RFC_BUSINESS_EXCEPT	String	The name of the BAPI/RFC function exception, which is used to raise business logic-related exception. If this environment variable is not specified when a business logic-related error occurs, the application will abort.

Table 6-10 Generic Configuration Variables for the RFC R/3 to eLink Server

Task / Variable	Value	Description
CR3_TUX_ACTION	TPCALL	Defines the TUXEDO action that is to be performed when the BAPI/RFC function specified in the label is executed and the BAPI/RFC call received from SAP R/3. Note: Only the TUXEDO action should be specified.

CHAPTER

7 Configuring R/3 Connections

This topic describes how to configure your BEA eLink Adapter for R/3 BAPI/RFC installation for eLink to R/3 and R/3 to eLink communication with R/3. It includes the following main sections:

- Configuring eLink to R/3 Connections
- Configuring R/3 to eLink Connections
- Troubleshooting Connection Problems

Configuring eLink to R/3 Connections

The BAPI/RFC eLink to R/3 server uses the sideinfo method of connecting to R/3. The following sections describe the connection process:

- Setting Environment Variables for the eLink to R/3 Connection
- Configuring the sideinfo File

Setting Environment Variables for the eLink to R/3 Connection

Configure the environment variables for eLink to R/3 connections as shown in Table 7-1:

Table 7-1 Environment Variables for Connecting to R/3

Variable Name	Set To	Description
CR3_DESTINATION	System Name	Destination in the `sideinfo` file that defines the R/3 application server to connect to. Default is undefined.
CR3_CLIENT	Client Number	R/3 login client number. Default is undefined.
CR3_USER	User	R/3 login user. Default is undefined. The user must be of type CPIC.
CR3_PASSWORD	Password	R/3 login user password. Default is undefined.
CR3_LANGUAGE	E	R/3 login language. Default is E for English.
SIDE_INFO	Path and File	Full path to the `sideinfo` file. See "Specifying the Location of the sideinfo File" in a later section.

The following are sample settings in an environment file:

Listing 7-1 Sample Environment Variable Settings for eLink to R/3 Connections

```
CR3_DESTINATION=SAPNODE
CR3_CLIENT=SAPCLIENT
CR3_USER=LOGINNAME
CR3_PASSWORD=LOGINPASSWORD
CR3_LANGUAGE=E
SIDE_INFO=<your eLink app directory>\sideinfo
```

The settings you specify depend on the configuration of your R/3 installation. See your R/3 system administrator for more information.

Configuring the sideinfo File

The BAPI/RFC eLink to R/3 server uses the `sideinfo` method of connecting to R/3. The sideinfo file is an ASCII text file that specifies the connection point for external programs to communicate with the R/3 application server. See your SAP R/3 documentation for more information about the `sideinfo` file.

The `sideinfo` file is associated with the parameters provided to the BAPI/RFC eLink to R/3 server when it is started. A sample `sideinfo` file comes with BEA eLink Adapter for R/3 BAPI/RFC, but you must configure this sample file for your particular R/3 environment and BEA eLink Adapter for R/3 BAPI/RFC installation. Errors in this file prevent the BAPI/RFC eLink to R/3 server from connecting to R/3.

Contents of the sideinfo File

The following table describes the attributes in the `sideinfo` file:

Table 7-2 Attributes in the sideinfo File

Attribute	Description
`DEST`	Connection identifier. You can set this to any name, usually a few characters in all uppercase. It is recommended that you use the node name of the R/3 application server. The BAPI/RFC eLink to R/3 servers uses this identifier to determine the R/3 application server to connect to. The BAPI/RFC eLink to R/3 server gets the identifier name from the CR3_DESTINATION environment variable that is defined in the server start-up script. The identifier links its setting to the connection.
`LU`	TCP/IP name of the node on which the R/3 application server is running. The BAPI/RFC eLink to R/3 server will open a TCP/IP socket to the R/3 application node. The LU can be specified as the full TCP/IP name or as an alias. This name or alias must match exactly what is specified in the hosts file, or it must be translated by the directory name service. Test this by using the `ping` command and the exact string used in the LU line item (`ping node`).

Table 7-2 Attributes in the sideinfo File

Attribute	Description
TP	Name of the R/3 user presentation connection socket (the network socket to which the SAPGUI connects). This name is configured in R/3 and is specific to the instance of R/3. The last two characters in the name specify the instance number. This name must appear in the services file on the node on which the BAPI/RFC eLink to R/3 is running, and the value of the socket number must match the same number in the services file on the R/3 application server.
GWHOST	Node name for the R/3 Gateway. As with the LU attribute, it must be translated correctly into a TCP/IP address (test it by using the ping command to `ping` the node). The gateway host is usually the same node as the R/3 application server, although this is not required. The R/3 Gateway process might reside on a different node. If the gateway must be moved, then the gateway identifier must be changed in the R/3 profile. Be sure to check with the R/3 system manager to ensure that this value matches the gateway location.
GWSERV	Name of the TCP/IP socket that is the R/3 Gateway connection. All processes connecting to R/3 in the background use this socket number as an entry point. As with the TP attribute, this name must be defined in the services file on the node on which the BAPI/RFC eLink to R/3 server is running, and the definition must match the definition of the R/3 application server.

In an R/3 environment with multiple R/3 application servers, this list of attributes is simply repeated for different node names, different instances of R/3, and possibly different gateways.

Sample Settings

The following listing shows sample settings in a `sideinfo` file:

Listing 7-2 Sample Settings for sideinfo File

```
DEST=SAPNODE
LU=nodename
TP=sapdp00
PROTOCOL=I
GWHOST=nodename
GWSERV=sapgw00
```

Specifying the Location of the sideinfo File

The `sideinfo` file is usually located in the directory where the BAPI/RFC eLink to R/3 server is running (for example, the TUXEDO `appdir`). If you cannot use this location in your environment (for example, a number of other processes also connect to R/3 and use the same sideinfo information), then you can avoid duplicating the file by assigning the SIDE_INFO environment variable to a path containing the sideinfo table, as shown in the following examples:

UNIX C shell (csh):

`setenv SIDE_INFO` *`your eLink app directory`*`/sideinfo`

Windows NT:

`set SIDE_INFO=`*`your eLink app directory`*`\sideinfo`

The `sideinfo` file must have protections set so that all processes can read it.

For the BAPI/RFC eLink to R/3 server, this environment variable is defined in the server start-up script. See "Setting Environment Variables for BAPI/RFC eLink to R/3" in Chapter 6, "Configuring BAPI/RFC Integration," for more information.

Configuring R/3 to eLink Connections

The RFC R/3 to eLink server uses the register mode method of connecting to R/3. When the RFC R/3 to eLink server is started, it connects to R/3 and registers with a specific Program ID. This Program ID is defined in the BAPI/RFC destination, as defined in transaction SM59. When an BAPI/RFC is executed with the specified destination, the request is passed to the server registered on the Program ID. If no server is registered, then an error occurs. The server *must* be started and registered on the Program ID before the BAPI/RFC is executed.

To register with R/3, the following information must be passed to RFC R/3 to eLink as command line parameters (which are specified in the server start-up script):

Setting	Description
Program-Id	Program ID (text string). It must match the `program-id` defined in transaction SM59.
Gateway Host Name	Name of the host running the SAP gateway server. It must match the GWHOST parameter specified in the `sideinfo` file.
Gateway Service Name	Service name of the SAP gateway server. It must match the GWSERV parameter specified in the `sideinfo` file.

Troubleshooting Connection Problems

R/3 provides extensive help in isolating and testing connection problems involving the R/3 Gateway. The R/3 Gateway is sometimes called the CPIC Gateway because the CPIC protocol is the lowest-level protocol used on the TCP/IP socket when connecting to R/3. RFCs/BAPIs are essentially layered on CPIC.

To troubleshoot connection problems:

- Verify that the TCP/IP network is functioning by using network testing.
- Examine your R/3 installation. Common problems arise from typographical errors in the `sideinfo` file, the hosts file, and the services file. Examine these files, bearing in mind that UNIX is case-sensitive (including TCP/IP translation and socket name translation).
- If problems persist, thoroughly examine the CPIC implementation on the R/3 application server. The R/3 documentation provides extensive material about the CPIC setup under the heading "BC - SAP Communication: Configuration." If necessary, the CPIC implementation can be modified to accommodate the BEA eLink Adapter for R/3 BAPI/RFC installation.

APPENDIX

A Sample cr3_bapi.ubb File

This topic describes the two preconfigured sample cr3_bapi.ubb files (for UNIX and Windows NT) that come with BEA eLink Adapter for R/3 BAPI/RFC.

UNIX

```
#####################################################################
*RESOURCES
#####################################################################

IPCKEY40000
DOMAINIDCR3
MASTERSITE1
MAXACCESSERS30
MAXSERVERS20
MAXSERVICES30
SCANUNIT10
SANITYSCAN12
BLOCKTIME30
MAXGTT200
MODELSHM
LDBALY

#####################################################################
*MACHINES
#####################################################################

<system name>
LMID=SITE1
TYPE="HP-UX"
TUXDIR="<your Tuxedo install directory>"
TUXCONFIG="<your Tuxedo app directory>/tuxconfig"
TLOGDEVICE ="<your Tuxedo app directory>/TLOG"
TLOGSIZE=10
```

```
APPDIR="<your Tuxedo app directory>"
ULOGPFX="<your Tuxedo app directory>/ULOG"
MAXWSCLIENTS=2
UID=278

########################################################################
*GROUPS
########################################################################

QUE
LMID=SITE1  GRPNO=1
TMSNAME=TMS_QM TMSCOUNT=2
OPENINFO="TUXEDO/QM:<your Tuxedo app directory>/QUE:QSPACE"

CR3
LMID=SITE1  GRPNO=2
TMSNAME=TMS TMSCOUNT=2

########################################################################
*SERVERS
########################################################################

DEFAULT:
CLOPT="-A"

TMQUEUE
SRVGRP=QUE SRVID=1
GRACE=0  RESTART=Y CONV=N  MAXGEN=10
CLOPT="-s QSPACE:TMQUEUE --  "

cr3rfcin
```

```
    SRVGRP=CR3 SRVID=4
CLOPT="-o cr3rfcin.log -- -i cr3rfcin -e cr3rfcin.env"

cr3rfcout
    SRVGRP=CR3 SRVID=5
CLOPT="-s CR3_RFC_OUT -o cr3rfcout.log -- -i cr3rfcout -e
cr3rfcout.env"

########################################################################
*SERVICES
########################################################################

CR3_RFC_IN
CR3_RFC_OUT
```

Windows NT

```
########################################################################
*RESOURCES
########################################################################

IPCKEY        40000
DOMAINIDCR3
MASTER        SITE1
MAXACCESSERS30
MAXSERVERS20
MAXSERVICES30
```

```
SCANUNIT10
SANITYSCAN12
BLOCKTIME30
MAXGTT        200
MODEL         SHM
LDBAL         Y

#########################################################################
*MACHINES
#########################################################################

<system name>
       LMID=SITE1
       TYPE="Win32"
       TUXDIR="<your Tuxedo install directory>"
       TUXCONFIG="<your eLink app directory>\tuxconfig"
       TLOGDEVICE ="<your eLink app directory>\TLOG"
       TLOGSIZE=10
       APPDIR="<your eLink app directory>"
       ULOGPFX="<your eLink app directory>\ULOG"
       MAXWSCLIENTS=2

#########################################################################
*GROUPS
#########################################################################

QUE
```

```
        LMID=SITE1  GRPNO=1
        TMSNAME=TMS_QM TMSCOUNT=2
        OPENINFO="TUXEDO/QM:<your eLink app directory>\QUE;QSPACE"

CR3
        LMID=SITE1  GRPNO=2
        TMSNAME=TMS TMSCOUNT=2

###############################################################
*SERVERS
###############################################################
DEFAULT:
        CLOPT="-A"

TMQUEUE
        SRVGRP=QUE SRVID=1
        GRACE=0  RESTART=Y CONV=N  MAXGEN=10
        CLOPT="-s QSPACE:TMQUEUE --  "

cr3rfcin
    SRVGRP=CR3 SRVID=4
        CLOPT="-o cr3rfcin.log -- -i cr3rfcin -e cr3rfcin.env"

cr3rfcout
    SRVGRP=CR3 SRVID=5
        CLOPT="-s CR3_RFC_OUT -o cr3rfcout.log -- -i cr3rfcout -e
cr3rfcout.env"
```

```
#####################################################################
*SERVICES
#####################################################################

CR3_RFC_IN
CR3_RFC_OUT
```

A Sample cr3_bapi.ubb File

Glossary

ABAP/4

The SAP internal programming language of R/3.

ALE

SAP's Application Link Enabling technology that provides distributed processing for R/3 systems and third-party systems through the broadcast and guaranteed delivery of IDOCs to their appropriate destination(s).

ALE eLink to R/3

The BEA eLink Adapter for R/3 BAPI/RFC component server that processes and submits eLink to R/3 IDOCs to R/3 for ALE processing.

ALE R/3 to eLink

The BEA eLink Adapter for R/3 BAPI/RFC component client that receives and processes R/3 to eLink IDOCs from R/3.

BAPI

SAP's Business Application Programming Interface, which provides remotely-callable BAPIs (methods) that are associated with R/3 Business Objects.

BAPI/RFC eLink to R/3

The BEA eLink Adapter for R/3 BAPI/RFC component that allows non-R/3 applications to execute BAPI/RFC-enabled APAB/4 functions.

BDC

SAP's Batch Data Control, which processes screen-oriented data in transactions.

BDC Transaction Executor

The BEA eLink Adapter for R/3 BAPI/RFC component that allows non-R/3 application to submit BDC data to R/3.

BO

SAP Business Object framework that provides an object-oriented model of the enterprise. For example, a Sales Order is represented in R/3 as a Business Object.

BOR

SAP's Business Object Repository that contains the definitions of R/3 Business Objects and their associated BAPIs.

eLink Adapter for R/3 BAPI/RFC

BEA eLink Adapter for R/3 BAPI/RFC (Business Application Programming Interface / Remote Function Call) is the infrastructure of choice for application integration with the SAP R/3 environment. It works with mission-critical, high-performance middleware to enable easy application integration with and real-time access to SAP R/3 transactions, functions and data.

FML

BEA's Field Manipulation Language, a type of message buffer in ATMI. In BEA eLink Adapter for R/3 BAPI/RFC documentation, FML *always* refers to FML32.

IDOC

SAP's Intermediate Document (a flat file record of data) that is distributed via ALE.

R/3

SAP's client-server product that provides access to the SAP system via a three-tier architecture consisting of database, application, and presentation components.

RFC

SAP's Remote Function Call interface that allows non-R/3 systems to invoke remotely callable ABAP/4 functions. Synchronous RFC, transactional RFC (tRFC), and asynchronous RFC (aRFC) styles are supported.

RFC R/3 to eLink

The BEA eLink Adapter for R/3 BAPI/RFC component that allows R/3 to access data and functionality in non-R/3 applications.

SAPGUI

SAP's graphical user interface utility.

TID

Transaction ID for tracking IDOC transactions.

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