LE Subprograms

This document applies to z/OS batch mode, z/VSE batch mode, IMS TM and TSO. It provides information on how Natural supports IBM Language Environment (LE) subprograms.

The following topics are covered:

- Support of IBM LE Subprograms

- Enabling Natural Support of LE Subprograms

- Passing LE Runtime Options

- LE Abend Handling

Support of IBM LE Subprograms

To support IBM Language Environment (LE) subprograms, Natural must be prepared for the `CALL` statement to be able to call LE subprograms. LE subprograms can be static (profile parameters `CSTATIC` and `RCA`) or dynamic subprograms of Natural.

Dynamic subprograms of Natural (LE and non-LE) are loaded via LE services (`CEEFETCH` or `CEELOAD` macro). All dynamic subprograms loaded during a Natural session are deleted upon LE environment termination, i.e. during termination of the Natural session. That is, the profile parameter `DELETE` does not have any effect.

Enabling Natural Support of LE Subprograms

The following is required to be able to call LE subprograms from Natural:

1. When installing Natural, the corresponding driver must be generated with option LE370=YES. For LE enablement of Natural under CICS, see *Natural under CICS*, *Natural CICS Interface and IBM Language Environment (LE)* (in the Natural *TP Monitor Interfaces* documentation).

2. The IBM LE runtime modules must automatically be included from the IBM LE library during the linkage editor step. There must not be any unresolved externals starting with "CEE." Do not set the linkage editor option NCAL for z/OS or `NOAUTO` for z/VSE.

3. Under z/OS batch, IMS TM and TSO, Natural can also call LE main programs, but only as dynamic subprograms. If an LE main program is to be called dynamically, this has to be indicated by specifying `SET CONTROL 'P=L'` before the `CALL` statement. Otherwise, the LE environment created by Natural will be terminated by the LE main program.

Passing LE Runtime Options

- Passing LE Runtime Options under z/OS Batch and TSO

- Passing LE Runtime Options under z/VSE Batch

- Passing LE Runtime Options under IMS TM

Passing LE Runtime Options under z/OS Batch and TSO

You have two options:

1. You can pass LE run-time options by using the `PARM=` parameter in your JCL. The following applies:

   - The run-time options that are passed to the main routine must be followed by a slash (/) to separate them from the Natural parameters.

   - If you want to use a slash within your Natural parameters, then your Natural parameters must begin with a slash.

   Example:

   ```
   PARM='/ID=/,...'
   ```

2. You can pass LE run-time options by using the `CEEOPTS` input data set in your JCL. With the use of `CEEOPTS` the LE run-time options are also available to all subtasks. The use of `CEEOPTS` is especially required with a Natural RPC server in batch mode.

   Example:

   ```
   //CEEOPTS  DD    *
   POSIX(ON)
   /*
   ```

Passing LE Runtime Options under z/VSE Batch

You can pass LE run-time options by using the `PARM=` parameter in your JCL. The following applies:

- The run-time options that are passed to the main routine must be followed by a slash (/) to separate them from the Natural parameters.

- If you want to use a slash within your Natural parameters, then your Natural parameters must begin with a slash.

Example:

```
PARM='/ID=/,...'
```

Passing LE Runtime Options under IMS TM

You can pass LE run-time options by providing the region-specific run-time options load module `CEEROPT` in your `STEPLIB` concatenation. In addition, the LE library routine retention initialization routine `CEELRRIN` must be present on the `PREINIT` list of your region JCL.

The following is a sample definition of a `CEEROPT` load modul that allows the execution of `AMODE(24)` subprograms:

```
CEEROPT  CSECT
CEEROPT  AMODE ANY
CEEROPT  RMODE ANY
         CEEXOPT ALL31=((OFF),OVR),                                     X
                 STACK=((128K,128K,BELOW,KEEP,512K,128K),OVR)
         END   CEEROPT
```

LE Abend Handling

Natural supports the LE-specific user error handling, that is, if an LE subprogram has defined a user error handler, this handler gets control when an abend, a program check or any other LE error condition occurs in the subprogram. If no LE user error handler has been defined, Natural reacts according to the setting of the DU profile parameter.

In this case, a special error message (NAT0950 if DU=OFF or NAT9967 if DU=ON) is issued which indicates the LE error number. In addition, the corresponding LE error message is issued on CEEMSG and an LE snap dump is written to CEEDUMP according to LE run-time option TERMTHDACT.

Note:
In case of DU=FORCE, the abend handling of Natural is disabled and the LE error handling takes place even if no LE subprogram is active at the time of the abend. In this case, it is strongly recommended to specify the LE run-time option TERMTHDACT(UAIMM) to get all required diagnostic informations.