

NDB - Natural for DB2 Server Stub

A Natural for DB2 (NDB) server stub is an interface module needed to communicate between the DB2 database system and the Natural server. The server stub module determines, sets up and invokes a Natural server environment for executing Natural stored procedures and Natural user-defined functions.

As mentioned in Step 11 in Installation Procedure, there are two types of server stubs: the NDB start server stub (STR) and the NDB server stub (SRV). Both stubs are generated from the NDBSTUB macro.

Below is information on:

- NDB Start Server Stub
- NDB Server Stub
- JCL Procedure
- Macro NDBSTUB

NDB Start Server Stub

The NDB start server is used for setting up the Natural server environments desired. The start server stub must be the main execution program in the Stored Procedure Address Space (SPAS). After the start server stub has established the Natural server environments, it passes control to the appropriate DB2 program (DSNX9WLM for WLM SPAS and DSNX9STP for DB2 SPAS). When SPAS terminates, the DB2 program returns control to the start server stub. The start server stub stops the Natural server environments and returns control to the operating system.

The NDB start server stub reads the names and parameters of the Natural server to be started from the CMSRVIN dataset. CMSRVIN must be specified with DDNAME CMSRVIN.

The CMSRVIN dataset is a sequential file that contains all information required to start the desired Natural servers. For each server to be started, one START entry must be provided. The parameters used for the START entries are identical to the parameters that apply to the NDBSTUB macro. Enclose the contents of each START entry in brackets and delimit comments by the following signs: /* and */.

Example of START Entries:

```
START=( SERVER=WDB41SRV , NATURAL=NATBAT4R , CMPRMIN=CMPRMIN ,
        CMPRINT=CMPRINT , CMTRACE=CMTRACE , THREADSIZE=768 ,
        THREADNUMBER=2 , TRACE=ON )
START=( SERVER=WDB4SSRV , NATURAL=NATBAT4R , CMPRMIN=CMPRMIN ,
        CMPRINT=CMPRINT , CMTRACE=CMTRACE , THREADSIZE=768 ,
        THREADNUMBER=2 , TRACE=ON )
/*  START=( SERVER=QE41SRV , NATURAL=NATBAT41 , CMPRMIN=QAPARM4 ,  */
/*      CMPRINT=CMPRINT , CMTRACE=CMTRACE , THREADSIZE=700 ,  */
/*      THREADNUMBER=2 , TRACE=OFF )  */
```

If the start server dataset is missing or has not been assigned, the start server stub will start a Natural server environment with the parameters that derive from the parameters defined for the start server stub itself.

NDB Server Stub

The NDB server stub is the link between DB2 and Natural stored procedures or Natural user-defined functions (Natural UDFs). Specify the NDB server stub as EXTERNAL NAME in the SYSIBM.SYSROUTINES table row that refers to the Natural stored procedure or Natural UDF. The server stub is started by DB2/WLM when the Natural stored procedures or Natural UDFs are invoked. The NDB server stub creates a Natural session in the Natural server environment and invokes the Natural subprogram comprising the Natural stored procedure or the

Natural UDF.

A Natural session created for executing a Natural stored procedure terminates when the corresponding Natural subprogram ends and control returns to DB2 and to the calling client.

A Natural session created for executing a Natural UDF stays active for multiple function invocations if the PARALLEL attribute is set to **D** and the FINAL CALL attribute is set to **Y**. The session invoked for a Natural UDF function is terminated by the server stub if it detects a termination call.

JCL Procedure

The JCL procedure of the Stored Procedure Address Space (SPAS) must specify the NDB start server stub as program in the EXEC statement.

The NDB start server stub and the NDB server stub must reside in a library contained in the steplib concatenation of the JCL procedure of the SPAS.

Example JCL:

```

//*****
//*      JCL FOR RUNNING THE WLM-ESTABLISHED STORED PROCEDURES
//*      ADDRESS SPACE
//*      RGN      -- MVS REGION SIZE FOR THE ADDRESS SPACE.
//*      DB2SSN  -- DB2 SUBSYSTEM NAME.
//*      NUMTCB  -- NUMBER OF TCBS USED TO
//*              PROCESS END USER REQUESTS.
//*      APPLENV -- MVS WLM APPLICATION ENVIRONMENT
//*              SUPPORTED BY THIS JCL PROCEDURE.
//
//*****
//DB27ENV2 PROC RGN=0K,APPLENV=DB27ENV2,DB2SSN=DB27,NUMTCB=8
//IEFPROC EXEC PGM=WDB41STR,REGION=&RGN,TIME=NOLIMIT, /* NDB start server stub
/*IEFPROC EXEC PGM=DSNX9WLM,REGION=&RGN,TIME=NOLIMIT,
//      PARM='&DB2SSN,&NUMTCB,&APPLENV'
//STEPLIB DD DISP=SHR,DSN=DSN710.RUNLIB.LOAD
//      DD DISP=SHR,DSN=CEE.SCEERUN
//      DD DISP=SHR,DSN=DSN710.SDSNLOAD
//      DD DISP=SHR,DSN=NATURAL.V2.TEST.NUCLEUS /* Library containing stubs and Natural nucleus
//CMPRMIN DD DISP=SHR,DSN=SAG.SYSF.SOURCE2(TDB31PRM) /* Dynamic Natural parameters.
//CMSRVIN DD DISP=SHR,DSN=SAG.SYSF.SOURCE2(CMSRVIN) /* Servers to be started.
//CEEDUMP DD SYSOUT=X
//SYSOUT DD SYSOUT=X /* Traces records of the NDB server stub
//RMTRACE DD SYSOUT=X
//CMPRINT DD SYSOUT=X
//SYSPRINT DD SYSOUT=X
//SYSERROR DD SYSOUT=X
//SYSUDUMP DD SYSOUT=X

```

Macro NDBSTUB

The NDBSTUB macro is used to generate the NDB server stub and NDB start server stub. You can parameterize NDBSTUB to create different stubs.

Below are the parameters available with NDBSTUB:

CMPRINT	DDNAME of MPRINT dataset
CMPRMIN	DDNAME of CMPRMIN dataset
CMTRACE	DDNAME of CMTRACE dataset
GTRACE	NDB server stub to execute GTRACE calls
GTRCID	GTRACE ID to be used
MAIN	No longer relevant and only maintained for compatibility reasons
MODE	Operation mode of NDB server stub
NATURAL	Name of server front-end or Natural server
SERVER	Server name for Natural server environment
THREADNUMBER	No longer relevant and only maintained for compatibility reasons
THREADSIZE	Size of Natural threads for Natural server
TRACE	NDB server stub to write trace records
WLM	NDB start server stub mode WLM/DB2 SPAS



CMPRINT

Possible Values	Default Value
8 character DDNAME	CMPRINT

CMPRINT specifies the DDNAME of the CPRINT dataset to which the primary report output is written. If an asterisk (*) is specified, a unique DDNAME *Pnnnnnnn* is built whenever a Natural stored procedure is invoked.

CMPRMIN

Possible Values	Default Value
8 character DDNAME	CMPRMIN

CMPRMIN specifies the DDNAME of the CMPRMIN dataset during startup to read the input PROFILE parameter for this server.

CMTRACE

Possible Values	Default Value
8 character DDNAME	CMTRACE

CMTRACE specifies the DDNAME of the CMTRACE dataset to which the primary report output is written. If an asterisk (*) is specified, a unique DDNAME *Pnnnnnnn* is built whenever a Natural stored procedure is invoked which makes it possible to store each output separately.

GTRACE

GTRACE specifies whether the NDB server stub executes GTRACE macro calls.

Possible Values	Default Value
ON/OFF	OFF

GTRACE specifies whether or not the server stub executes GTRACE macro calls for tracing purposes.

Value	Explanation
ON	The generated server stub executes GTRACE macros in order to document its processing.
OFF	The generated server stub does not execute GTRACE macros during its processing cycle.

GTRCID

Possible Values	Default Value
Decimal number from 0 to 1023	203

GTRCID specifies the event ID recorded with the trace data created by the NDB server stub.

MAIN

Possible Values	Default Value
YES/NO	YES

The value of MAIN is no longer evaluated. The NDB server stubs check whether they are invoked as IBM LE (Language Environment) main program or as IBM LE subprograms and react accordingly.

Value	Explanation
YES	The generated server stub operates as IBM Language Environment main program.
NO	The generated server stub operates as IBM Language Environment sub program.

MODE

Possible Values	Default Value
STR/SRV	SRV

MODE determines the operational mode of the NDB server stub generated.

Value	Explanation
STR	The generated NDB server stub operates as NDB start server stub that sets up the Natural server environment.
SRV	The generated NDB server stub operates as NDB server stub that invokes the associated Natural stored procedure or Natural UDF.

NATURAL

Possible Values	Default Value
Any valid load module name	NATBAT41

NATURAL denotes the name of the server front-end or Natural server load module which will be loaded by the NDB server stub if the external CMSTART is not already resolved by the linkage editor during creation of the server stub. The named load module has to be present in any steplib of the stored procedure address space.

SERVER

Possible Values	Default Value
Up to 5 characters	NDB41

Server names suffixed with the three characters SRV denote the names of the servers used by the server front-end in order to identify the Natural server. These names must be unique within one address space.

THREADNUMBER

Possible Values	Default Value
Decimal number	10

The value of THREADNUMBER is no longer evaluated. Instead, the NDB start server stub uses the NUMTCB parameter of the SPAS JCL procedure as THREADNUMBER value. For further details, see the relevant DB2 literature by IBM.

THREADNUMBER determines the number of Natural threads used by the Natural server. This number limits the number of Natural stored procedures and Natural UDFs concurrently active in the Natural server.

THREADSIZE

Possible Values	Default Value
Decimal number	768

THREADSIZE determines the size of the Natural threads to be used by the Natural server. The size is specified in units of kilobytes.

TRACE

Determines whether the NDB server stub generated writes trace records. The trace records are written to the dataset specified with DDNAME SYSOUT.

Possible Values	Default Value
YES/NO	NO

WLM

WLM (Workload Manager) specifies where control is passed to after the NDB start server stub has established the Natural server environments requested. This parameter is only evaluated if the MODE parameter is set to MODE=STR. Specify WLM=YES if the NDB start server stub runs in an address space that has been established by WLM.

Value	Explanation
YES	The start server stub generated links to DSNX9WLM, after setting up the Natural server environments.
NO	The start server stub generated links to DSNX9STP, after setting up the Natural server environments. WLM=NO is the default.