

Using a Remote Directory Server - RDS

This section covers the following topics:

- RDS Principles of Operation
 - Using a Remote Directory Server
 - Creating an RDS Interface
 - Creating a Remote Directory Service Routine
 - Remote Directory Service Program RDSSCDIR
-

RDS Principles of Operation

You have two options to use a service directory:

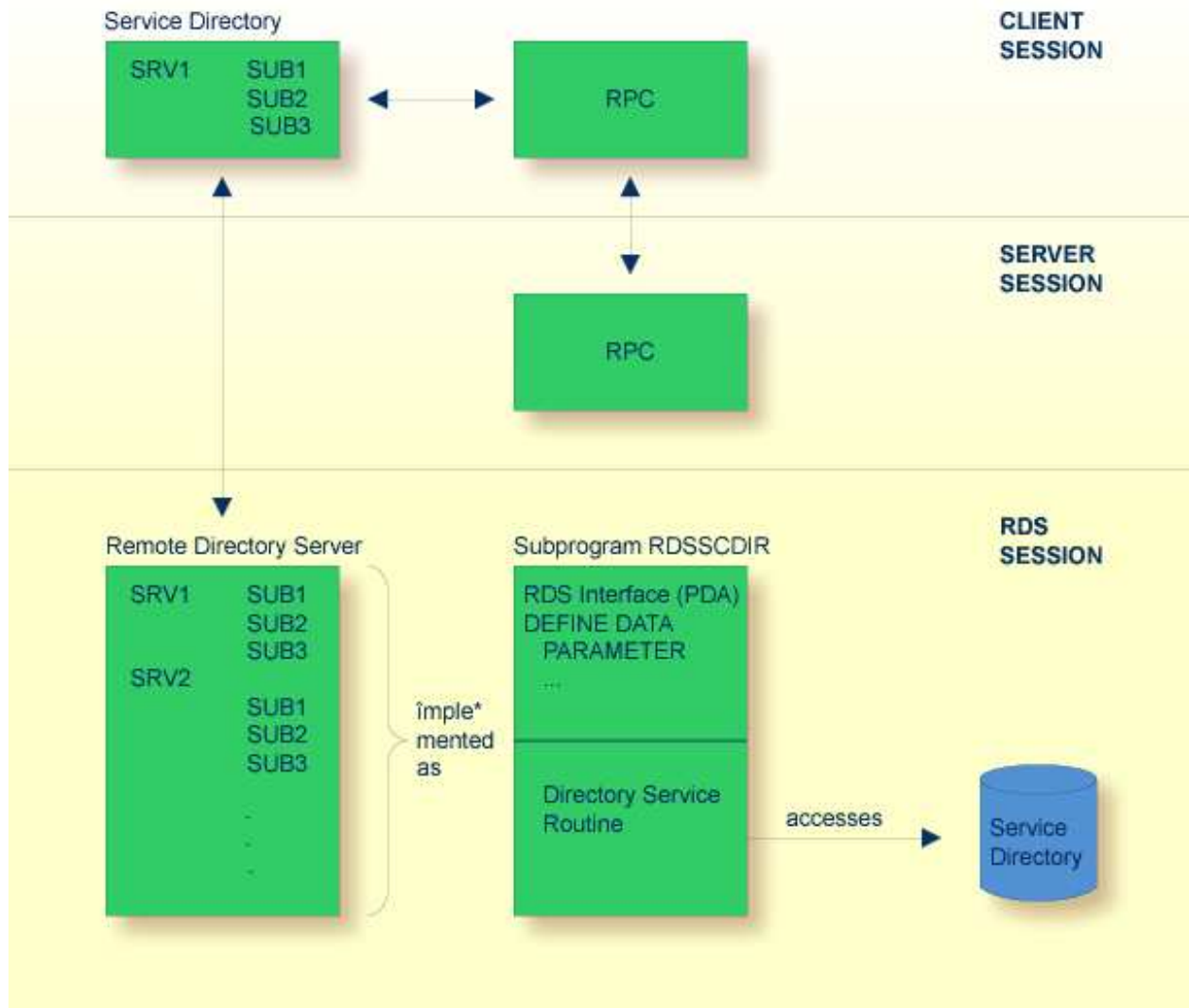
1. **Using a service directory in a Natural subprogram.**

Normally, to locate a service, the Natural RPC uses a service directory in a Natural subprogram. This directory is an initialized LDA data structure in program NATCLTGS generated by the *SYSRPC Remote Directory Maintenance Service Directory Maintenance* function and has to be available to every RPC client application.

2. **Using a remote directory.**

You can use a remote directory to locate a service. A remote directory server (RDS) enables you to define directory definitions in one place so that the RDS's services can be used by all clients in your environment.

This section describes **how to use a remote directory server to locate a service.**



The remote directory server is implemented as a Natural subprogram.

A sample of such a subprogram is provided in library `SYSRPC`. It is named `RDSSCDIR` and reads the required directory information from a work file. The interface of this subprogram is documented, which enables you to develop your own remote directory service. For more information, see the section *Creating an RDS Interface*.

The RDS interface is the Natural parameter data area of the Natural subprogram and the directory service routine is the code section of the Natural subprogram. If a remote `CALLNAT` is not found within the client's local service directory, the RPC runtime contacts the remote directory server by executing an internal remote `CALLNAT`.

An internal directory cache minimizes the access to the remote directory. The cache information is controlled by an expiration time which is defined by the remote directory server.

Using a Remote Directory Server

▶ To use a remote directory server

1. Create a Directory File

Create a directory file for the remote directory service using the Remote Directory Maintenance Service Directory Maintenance function of the `SYSRPC` utility. The subprogram `RDSSCDIR` is provided in the library `SYSRPC` and reads the directory information from a Natural work file (fixed-block, record length 80 bytes). This is the work file `CMWKF01` assigned to the appropriate dataset in the server startup `JCL`.

2. Start the Remote Directory Server

Start the remote directory server and proceed with the following steps.

3. Define RDS

You have two options:

- Specify the RDS in the keyword subparameter `RDS` of profile parameter `RPC` or parameter macro `NTRPC`.
- Or use the maintenance function of the `SYSRPC` utility to define remote directory servers (refer to *Remote Directory Maintenance Service Directory Maintenance* in the *SYSRPC Utility* documentation). The definition of remote directory servers is still supported for reasons of compatibility. You should, however, define your RDS in the keyword subparameter `RDS` of profile parameter `RPC` or parameter macro `NTRPC`. For this purpose, entries are provided that allow to define the location of the directory server. This enables you to expand existing local directory information by one or more remote directory server definitions.

Below is an example of how to define a remote directory server in the service directory `NATCLTGS`.

Service Directory					
	NODE	SERVER	LIBRARY	PROGRAM	LOGON
1	NODE1				
2		SERVER1			
3			SYSTEM		
4				TESTS1	
5				TESTS2	
6	RDSNODE				
7		DIRSRV1			
8			#ACI		
9				RDSSCDIR	

This example locally defines a server named SERVER1. This server may execute the services TESTS1 and TESTS2.

Additionally, there are definitions for the remote directory server DIRSRV1. A remote directory server is identified by a preceding hash (#) sign for the library definition.

The definitions of NODE and SERVER are used as usual in Natural RPC. The library definition defines the transport protocol (ACI) which has to be used to connect the RDS.

Finally, the PROGRAM entry contains the name of the remote subprogram which represents the remote directory service (in this case, it refers to the sample subprogram RDSSCDIR).

Creating an RDS Interface

The RDS interface is the parameter data area (PDA) of a Natural subprogram.

To create your own RDS interface you can use the parameter data area shown below.

```

DEFINE DATA PARAMETER
  1 P_UDID(B8)                /* OUT
  1 P_UDID_EXPIRATION(I4)    /* OUT
  1 P_CURSOR(I4)             /* INOUT
  1 P_ENTRIES(I4)           /* IN
  1 P_REQUEST(A16/1:250)    /* IN
  1 P_EXTENT(A16/1:250)     /* OUT
  1 P_RESULT(A32)           /* OUT
  1 REDEFINE P_RESULT
    2 SRV_NODE(A8)
    2 SRV_NODE_EXT(A8)
    2 SRV_NAME(A8)
    2 SRV_NAME_EXT(A8)
END-DEFINE

```

For an explanation of the parameters, refer to the table below.

Parameter	Format/Length	Explanation
P_UDID	B8	Unique directory identifier, should be increased after changing the directory information. The client saves this identifier in its cache. If the binary number increases from one client request to the next, it causes the client to delete its local cache information, because it no longer corresponds to the remote directory information.
P_UDID_EXPIRATION	I4	This defines the expiration time in seconds, that is, the number of seconds during which the client can use its local cache information without connecting the RDS to validate the UDID setting. It allows you to define a time limit after which you can be sure that your directory modifications are active for all clients. If you set this time to an unnecessarily low value, you may cause a lot of network traffic to the RDS.
P_CURSOR	I4	The remote procedure call has the option to scan for an alternative server if a connection to the previous one cannot be established; see keyword subparameter TRYALT of profile parameter RPC or parameter macro NTRPC. This parameter contains zero for a scan from the top and may be modified by the RDS to remember the record location to continue the scan. The value will not be evaluated by the client, it will only be inserted from the cache to continue scanning.
P_ENTRIES	I4	This parameter contains the number of service definitions in P_REQUEST.
P_REQUEST	A16/1:250	A list of services for which a server address can be scanned. An entry is structured as: program name (A8) library name (A8)
P_EXTENT	A16/1:250	Reserved for future use.
SRV_NODE	A8	Contains the server node.
SRV_NODE_EXT	A8	Contains the server node extension.
SRV_NAME	A8	Contains the server name.
SRV_NAME_EXT	A8	Contains the server name extension.

Creating a Remote Directory Service Routine

The Remote Directory Service Routine is the code area of a Natural subprogram (the default version of this code area is subprogram RDSSCDIR in library SYSRPC).

▶ To create your own RDS routine

- Modify the pseudo-code documented below.

```

Set UDID and UDID_EXPIRATION values
IF P_ENTRIES = 0
    ESCAPE ROUTINE
IF P_CURSOR != 0
    position to next server entry after P_CURSOR
    Scan for server which may execute P_REQUEST(*)
IF found
    SRV_NODE           = found node name
    SRV_NODE_EXT       = node extension
    SRV_NAME           = found server name
    SRV_NAME_EXT       = server extension
    P_CURSOR           = position of found server
ELSE
    P_CURSOR = 0

```

Remote Directory Service Program RDSSCDIR

This program is to be found in library SYSRPC. It reads the directory information from a work file (fixed-block, record length 80 byte).

Your program could also read the directory information from elsewhere (from a database, for example). For the delivered version of RDSSCDIR, this is the work file CMWKF01, which is assigned to the appropriate dataset in the server startup JCL.

Structure of the Directory Work File

```

* comment
UDID definition
UDID_EXPIRATION definition
node definition
...
node definition

```

UDID Definition

```

(UDID)
    binary number

```

UDID_EXPIRATION Definition

```

(UDID_EXPIRATION)
    number of seconds

```

Node Definition

```

(NODE)
    namevalue      (logon-option)
    server definition
    ...
    server definition

```

Server Definition

```
(SERVER)
  namevalue      (logon-option)
  library definition
  ...
  library definition
```

Library Definition

```
(LIBRARY)
  namevalue
  program definition
  ...
  program definition
```

Program Definition

```
(PROGRAM)
  namevalue
  ...
  namevalue
```

Namevalue

Max. 8 characters in uppercase

The *logon-option* after *namevalue* as well as the following definition lines are optional. For the possible values of *logon-option*, refer to *Service Directory Maintenance* in the SYSRPC utility documentation.

Example Directory Read from the Work File:

```
(UDID)
ACB8AAB4777CA000
  (UDID_EXPIRATION)
  3600
  * this is a comment
(NODE)
NODE1
  (SERVER)
  SERVER1
    (LIBRARY)
    SYSTEM
      (PROGRAM)
      TESTS1
      TESTS2
      TESTS3
  (SERVER)
  SERVER2 (logon-option)
    (LIBRARY)
    SYSTEM
      (PROGRAM)
      TESTS4
(NODE)
NODE2 (logon-option)
  (SERVER)
  SERVER1
    (LIBRARY)
    SYSTEM
      (PROGRAM)
```

```
TESTS1  
TESTS2  
TESTS3  
TESTS4
```

In the above example, the directory contains:

- Two servers SERVER1 and SERVER2 running on node NODE1.

The server SERVER1 may execute the programs TESTS1, TESTS2 and TESTS3 in library SYSTEM.

The server SERVER2 may execute the program TESTS4 on library SYSTEM.

- One server SERVER1 on node NODE2 which may execute the programs TESTS1 - TESTS4 in library SYSTEM.

The indentation of the lines in the example above is not required. All lines may start at any position (one). You can modify this file manually or generate it using the SYSRPC Remote Directory Maintenance function.