Samba XP 2009

Samba and Likewise RPC testing and comparing the implementations

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Agenda

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  - Testing environment
  - Limitations
  - A few \samr tests
- Part II
  - Creating new rpc client and server
  - Differences between Samba and LWISO
  - Testing simple rpc interface
  - Conclusions

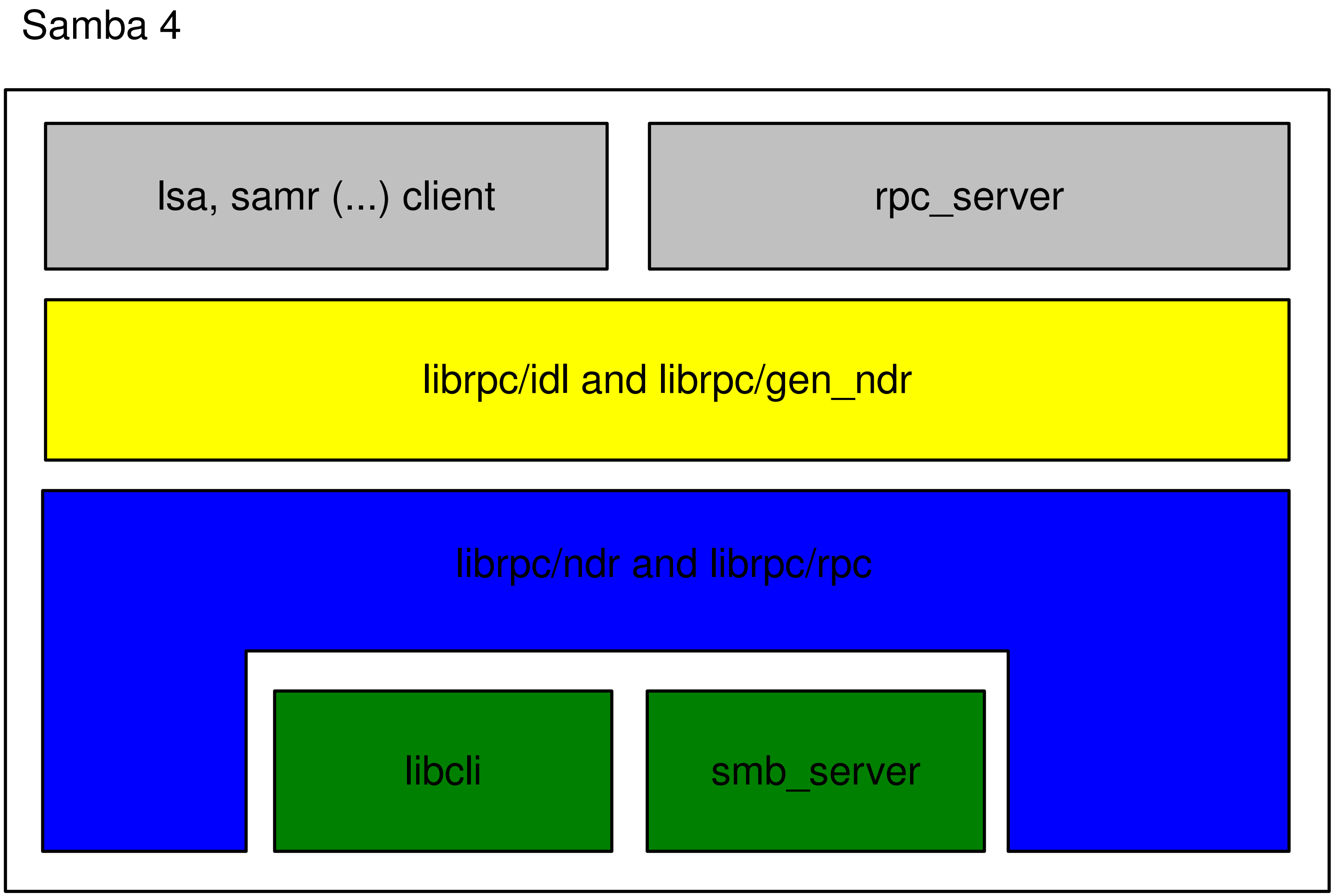
Part I:
Well-known rpc interfaces

Brief overview

Samba rpc implementation

- started when WinNT domains appeared (over 10 years ago!)
- based on scraps of information from the internet and a lot of time spent with tcpdump
- hand-marshalled (initially)
- idl-based since Samba 4 showed up
- idl-based also in Samba 3 thanks to Guenther Deschner's great effort

Brief overview



Brief overview

Likewise Open (LWISO) implementation

- client side started in late 2007
  - based on original DCE/RPC framework (publically released by Novell)
  - originally employing libsmbclient library
  - new implementation of smb client started in September last year
  - complete named pipes support added to DCE/RPC in December
  - now employing LWIO

Brief overview

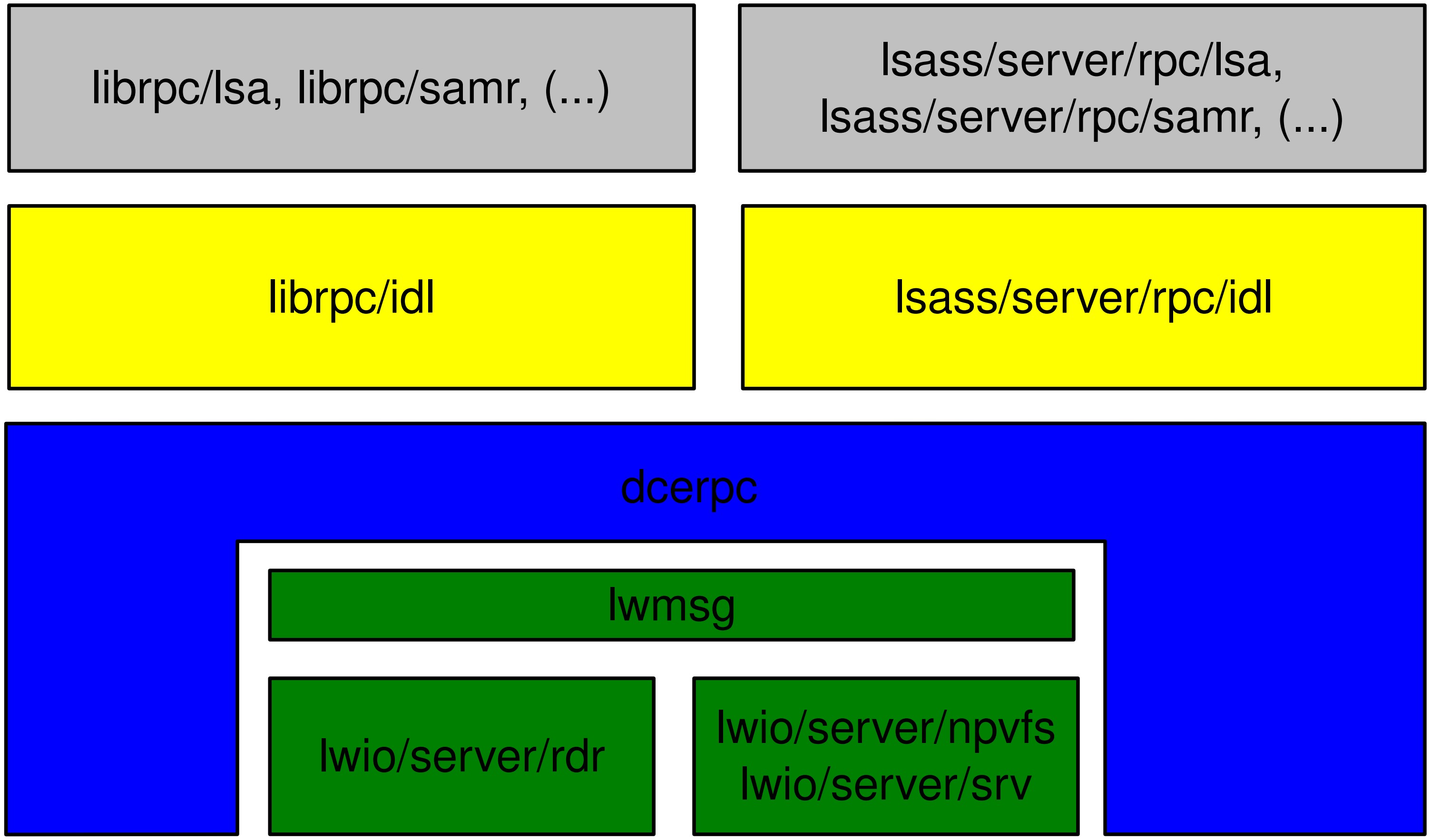
Likewise®

LWISO rpc implementation

- server side started with LWIO
  - original DCE/RPC framework doesn't support named pipes
  - LWIO includes named pipes server driver (npvfs)
  - this enables a server to listen on named pipe

Brief overview

LWISO



Testing environment

1) Ubuntu 7 with:
    1) Samba 4 provisioned as DC
    2) DNS server – primary for Samba 4
2) Ubuntu 8 with:
    1) LWISO joined to AD
3) Windows Server 2003 configured as:
    1) DC and primary DNS for (2)
    2) secondary DNS for (1)

Limitations

Samba configuration

- DC using krb5 for authentication
- DNS server running on the same system
- secondary DNS on windows server so all requests can be resolved asking the same server
- LWISO implements very limited set of rpc calls so far, so limited test has to be used too

Testing tool: smbtorture

Limitations

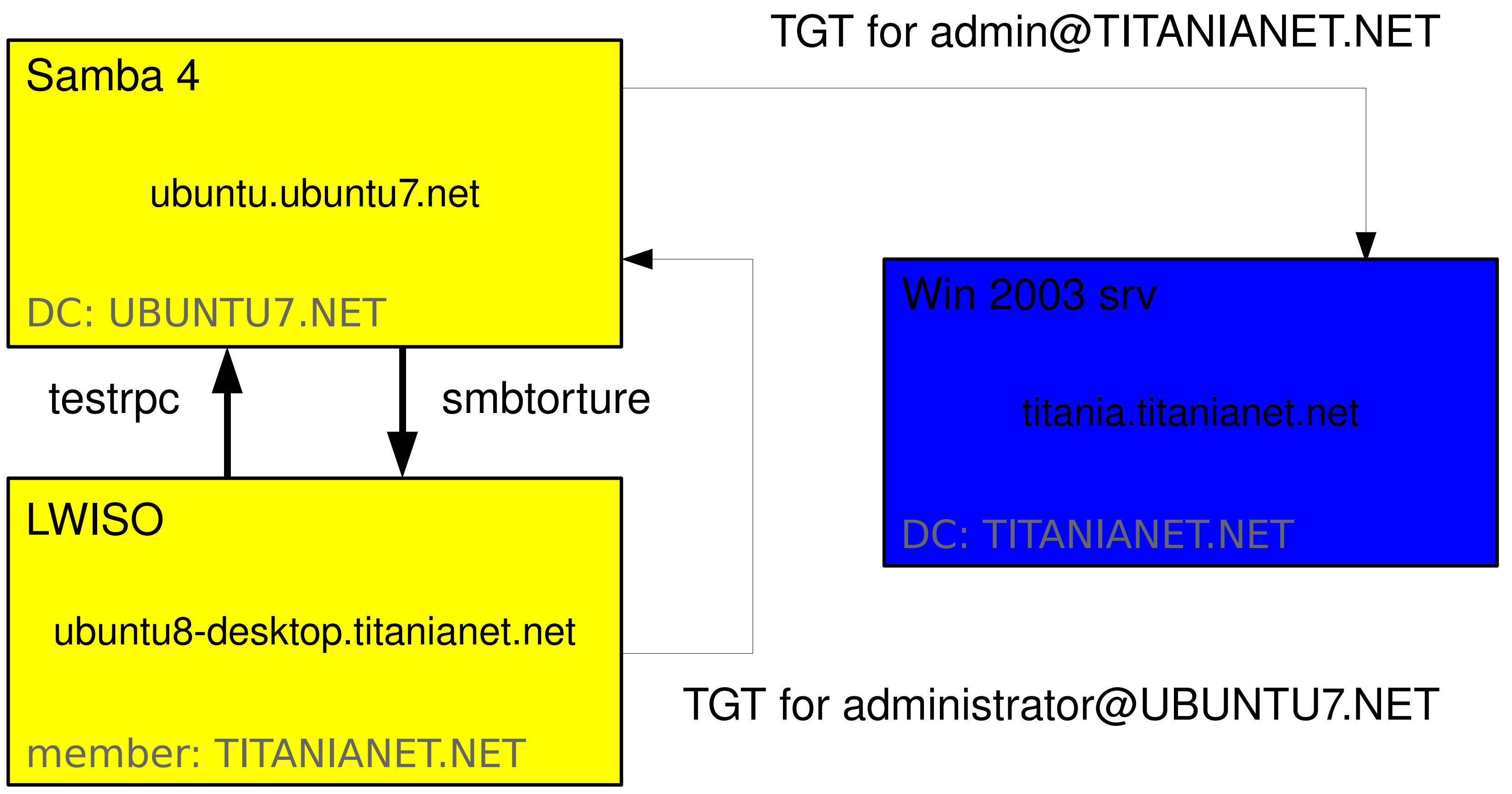
Likewise®

LWISO configuration

- there is no security checks yet, so this is only a test of NDR correctness
- security descriptor library is already implemented
- the missing part is passing authentication info to server side of DCE/RPC runtime which enables creating access token

Testing tool: testrpc

Testing environment



Running tests

Something simple for start – connect and enumerate domains

`SamrConnect[2-5]`

`SamrEnumDomains`

`SamrClose`

smbtorture: LWIS-SAMR-DOMAINS test

testrpc: SAMR-DOMAINS test

Running tests

Likewise®

One step further – query each domain info levels

```
SamrConnect[2-5]
SamrEnumDomains
SamrOpenDomain
SamrQueryDomainInfo
SamrClose
```

smbtorture: LWIS-SAMR-DOMAINS-QUERY test

testrpc: SAMR-DOMAINS-QUERY test

Running tests

More complexity – enumerate local users and groups

`SamrConnect[2-5]`

`SamrEnumDomains`

`SamrOpenDomain`

`SamrQueryDomainInfo`

`SamrEnumUsers, SamrEnumDomAliases`

`SamrClose`

smbtorture: LWIS-SAMR-USERS-ENUM test

testrpc: SAMR-USERS test

Part II:
Sample testing rpc service

Creating something new

How difficult is it to create a new rpc client and server in Samba ?

- create idl file and place it in librpc/idl
- add new SUBSYSTEM in librpc/config.mk
- optionally add torture test and modify torture/config.mk accordingly

Creating something new

- create new MODULE in rpc_server/config.mk
- declare rpc server init function in rpc_server/dcerpc_server.c
- create server directory/file in rpc_server and add actual function implementation

You're done!

Creating something new

How about LWISO environment ?

- create idl file
- create header file defining types and data structures used
- create directory for client library – there will be two libs built: DCE/RPC stub (result of compiling idl-generated source) and client implementation
- optionally create directory for test and link the test exec against client library

Creating something new

- create directory for server – there will be (server) stub library and server exec binary implementing the actual functions
- you may need to have separate idl files for client and server

That's it!

Simple client and server

Function *LwisoCopyUniString()*

- takes 2-byte unicode string *S* and
- unsigned integer *N*
- returns array of *N* copies of *S*

Simple client and server
Samba implementation

lwiso.idl

```
#include "idl_types.h"

[ uuid("83058420-2a7d-11de-9102-001a6bd01d81"),
  version(1.0),
  endpoint("ncacn_np:[\\pipe\\lwiso]", "ncacn_ip_tcp:"),
  pointer_default(unique),
  helpstring("Likewise Open RPC test")
]
interface lwiso
{
     typedef [public] struct {
          [string,charset(UTF16)] uint16 *str;
     } lwiso_UniStr;

     typedef struct {
          uint32 count;
          [size_is(count)] lwiso_UniStr *lwiso_str;
     } lwiso_UniStrArray;

     [public] NTSTATUS lwiso_CopyUniString(
          [in] uint32 num_copies,
          [in,string,charset(UTF16)] uint16 *str,
          [out,ref] lwiso_UniStrArray *array
          );
}
```

Simple client and server
LWISO implementation

lwiso.idl

```
[
uuid(83058420-2a7d-11de-9102-001a6bd01d81),
version(1.0),
pointer_default(unique)
]
interface lwiso
{
cpp_quote("#ifdef DCERPC_STUB_BUILD")

#include <lwiso/lwdefs.h>

cpp_quote("#endif")

    NTSTATUS _LwisoCopyUniString(
        [in] UINT32 uiNumCopies,
        [in,string] wchar16_t *pwszStr,
        [out,ref] LwisoUniStrArray *pArray
     );
}
```

Simple client and server
LWISO implementation

lwdefs.h

```
#include <lw/types.h>
#include <lw/ntstatus.h>


typedef struct {
#ifdef _DCE_IDL_
    [string]
#endif
    wchar16_t *str;
} LwisoUniStr, LWISO_UNISTR, *PLWISO_UNISTR;

typedef struct {
    UINT32 uiCount;
#ifdef _DCE_IDL_
    [size_is(uiCount)]
#endif
    LwisoUniStr *pStr;
} LwisoUniStrArray, LWISO_UNISTR_ARRAY, *PLWISO_UNISTR_ARRAY;
```

Let's call each other!

`LwisoCopyUniString`

smbtorture: LWIS-COPY-UNISTR test

testlwiso: LWISO-COPY-UNISTR test

Conclusions

- Creating new rpc interface in Samba is a really quick process
- Building it <u>inside</u> Samba source tree is the price to be paid
- LWISO enables building a completely separate product (where you have to take care of many basic things yourself)
- Obviously it requires necessary <u>shared libraries and headers</u>

Sources

Likewise Open git tree:

git://git.likewise.com/likewise-open.git

My samba git tree:

git://git.samba.org/mimir/samba.git

Thank you for your attention!