SUSE Linux Enterprise Server in an Active Directory Domain

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Agenda

Introduction

Practical scenario's for SLES 11 SP2:

- Participating in an Active Directory
- Integration of Apache with Active Directory

Bleeding Edge Samba 4

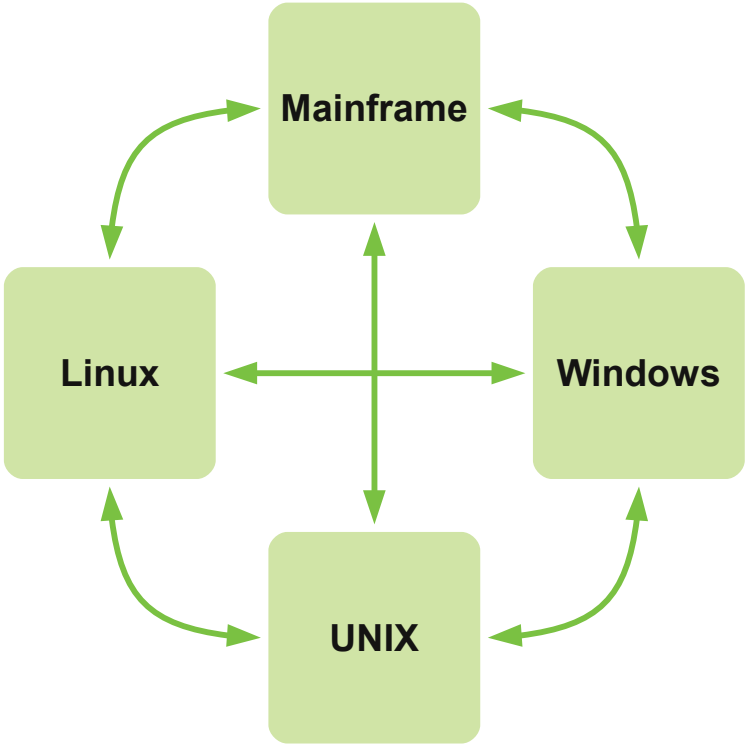
- Server side copy
- Prototype implementation of “Previous versions”

Questions

Introduction

Data Center Interoperability
The Playfield

Platforms



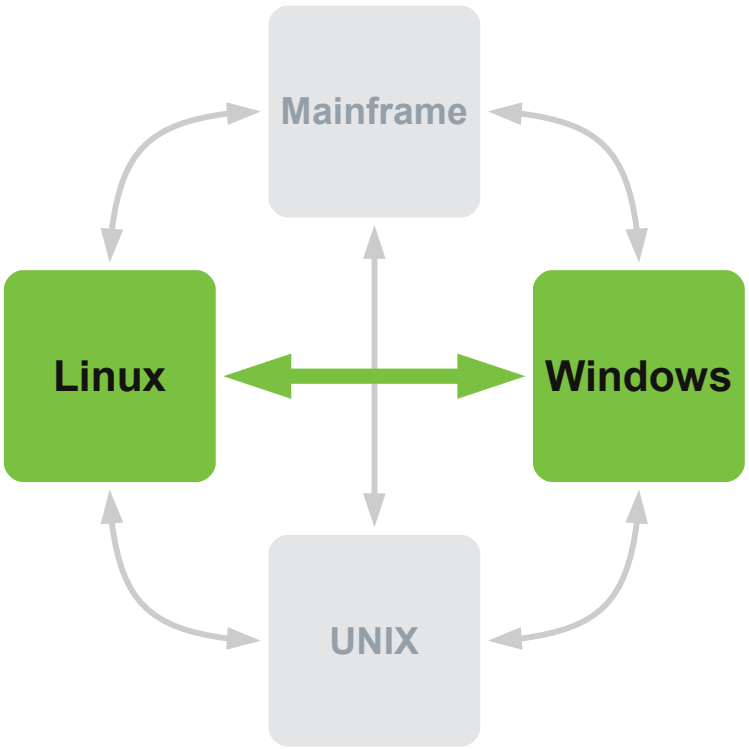
Observable trends (in general):

- Legacy Unix holds or declines
- Mainframe:
  - z/OS holds
  - Linux on System z emerging
- Linux and Windows grow

Linux – Windows Interoperability

The playfield

Platforms



Interoperability Topics

Scope:

> Services <

Virtualization

Systems Management

Documents

Scripting Languages

Porting and running software

Linux – Windows Interoperability Scenario's

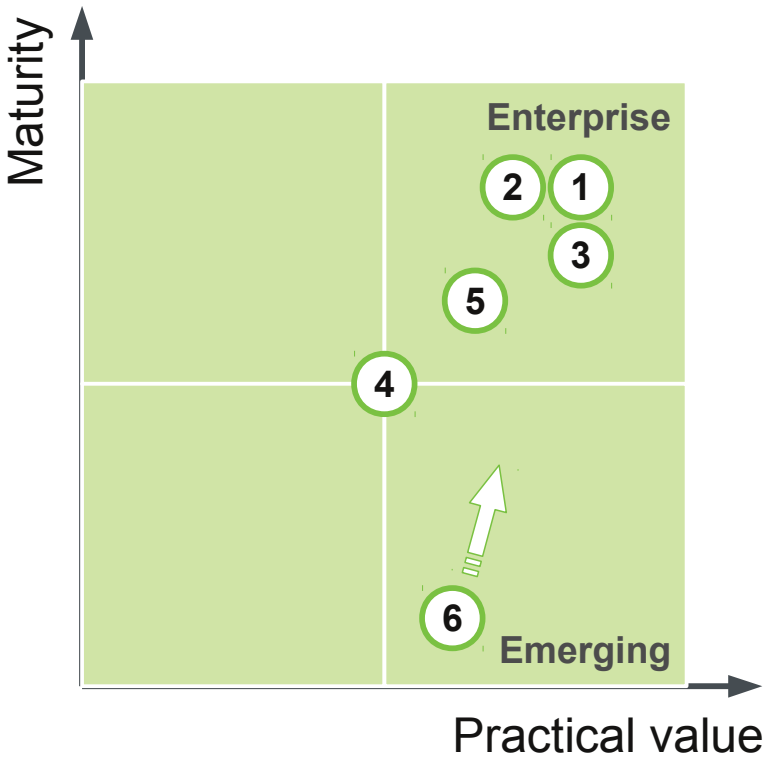
Practical scenario's

1. SLES Participating in an Active Directory domain

2. Integration of Apache with Active Directory

Linux – Windows Interoperability Scenario's

Practical value vs. Maturity



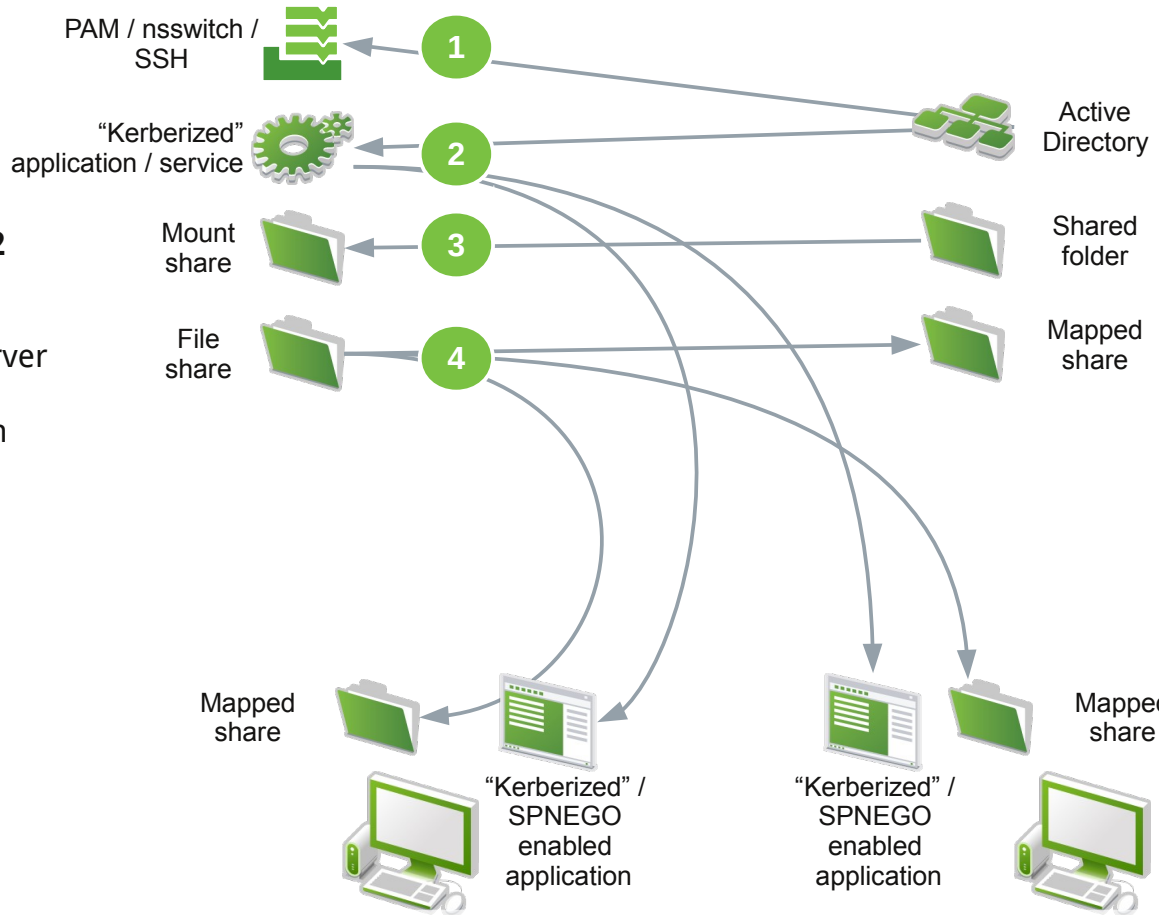
1. SLES Participating in an Active Directory domain
2. Integration of Apache on SLES with Active Directory
3. SLES and Samba as domain controller
4. Windows Remote Desktop on Linux
5. ODBC connection to MS SQL
6. Prototype Samba implementation of “Recovery Point”

Practical scenario's for SLES 11 SP2

Scenario 1:
SLES as member server in Active Directory domain

SLES 11 SP2

Role:
Member server
AD:
ad.demo.lan
Hostname:
interop01



Windows XP (winxp01.ad.demo.lan)

Windows 7 (win764.ad.demo.lan)

Windows 2008 R2

Role:
AD Domain Controller
AD domain name:
ad.demo.lan
NT-style domain name:
INTEROP
Hostname:
win200864

See also:
- more detailed documentation
- Interop Demo appliance

Scenario 1:
Join as member server in Active Directory domain

- Pre-requisites
  - Correct NTP settings
    Correct timezone settings
  - Correct DNS name, forward and backward for all hosts
  - Authorized AD service account to join machines (typically “Administrator”)
- Concepts
  - Kerberos
    - Principal / Service Principal
    - Ticket Granting Ticket
    - Keytab file
  - LDAP
    - sssd (System Security Services Daemon)
  - PAM, NSS
  - SASL, GSSAPI, SPNEGO

Scenario 1:
Join as member server in Active Directory domain

- Steps on Linux
  - openSUSE, SUSE Linux Enterprise:
    Join the AD domain using *YaST → Windows Domain Membership*
  - Other Linux distros:
    Join the AD domain with the manual procedure
    `(smb.conf; krb5.conf; `net ads join -U Administrator%password`)`
  - Required packages on SLES:
    `samba-client, samba-winbind(pam_winbind.so, libnss_winbind.so, idmap) krb5 (libgssapi_krb5)`
- Steps on Active Directory
  - No requisite steps

Scenario 1:
Use Case 1/a: Integrate PAM and nsswitch with AD

/etc/pam.d/common-auth

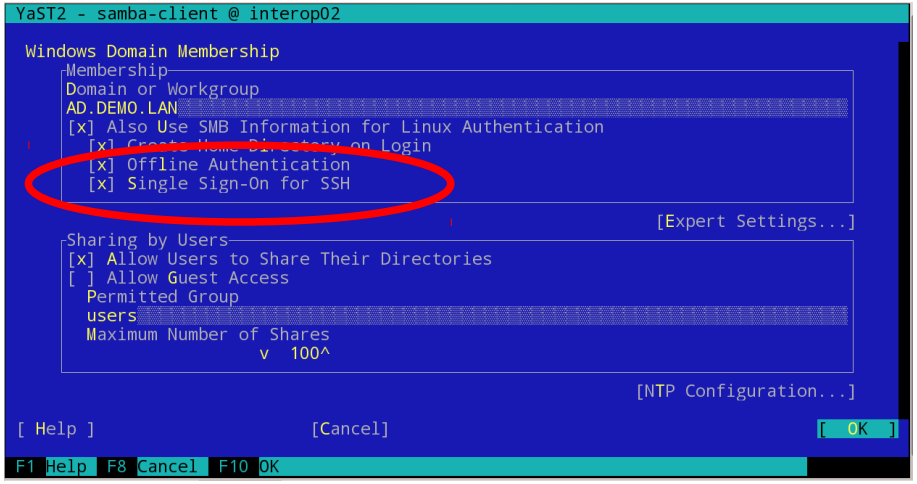
```
interop01:~ # cat /etc/pam.d/common-auth
#%PAM-1.0
auth    required        pam_env.so
auth    sufficient      pam_unix2.so
auth    required        pam_winbind.so  use_first_pass
interop01:~ #
```

/etc/nsswitch.conf

```
interop01:~ # cat /etc/nsswitch.conf
# [...]

passwd: winbind compat
group:  winbind compat

# […]
interop01:~ #
```

Scenario 1:

Use Case 1/a: Integrate SSHD with AD



Configure SSHD

```
interop01:~ # cat /etc/ssh/sshd_config
# [...]
GSSAPIAuthentication yes
GSSAPICleanupCredentials yes
ChallengeResponseAuthentication yes
# [...]
interop01:~ #
```

Login from remote host

```
remote-host:~ $ ssh 'INTEROP\Administrator'@interop02
Password:
Creating directory '/home/INTEROP/administrator'.
INTEROP\administrator@interop02:~>
```

Kerberos credentials

```
INTEROP\administrator@interop02:~> klist
Ticket cache: FILE:/tmp/krb5cc_10000
Default principal: Administrator@AD.DEMO.LAN

Valid starting     Expires            Service principal
04/06/13 10:22:28  04/06/13 20:22:28  krbtgt/AD.DEMO.LAN@AD.DEMO.LAN
        renew until 04/13/13 10:22:28
04/06/13 10:22:28  04/06/13 20:22:28  INTEROP02$@AD.DEMO.LAN
        renew until 04/13/13 10:22:28

Kerberos 4 ticket cache: /tmp/tkt10000
klist: You have no tickets cached
INTEROP\administrator@interop02:~>
```

Scenario 1:
Use Case 1/b: Restrict shell access to AD group

- Steps on SLES
  - Manually amend the pam_winbind configuration file to restrict allowed users
- Steps on Active Directory
  - Add group “`SLES Shell Users`”
  - Add user “Administrator” to “`SLES Shell Users`”

/etc/security/pam_winbind.conf

```
[global]
  cached_login = yes
  krb5_auth = yes
  krb5_ccache_type = FILE
  debug = yes
  require_membership_of = "SLES Shell Users"
```

See also: Interop Demo appliance

Scenario 1:
Use Case 2: Integrate SPNGO enabled applications with AD

- Applications using GSSAPI, SASL or Java GSS libraries

- GSSAPI
  - SLES pkg: krb5 (1.6+)
  - C lib: `/usr/lib64/libgssapi_krb5.so.2`
  - Java lib: Java GSS
  - Applications:
    - Mod_auth_kerb (Apache), PostgreSQL, etc..

- SASL API
  - SLES pkg: cyrus-sasl
  - C lib: `/usr/lib64/libsasl2.so.2`
  - Java lib: Java SASL
  - Applications:
    - OpenLDAP2 (Server, clients)
    - Cyrus IMAP, etc...
    - Postfix
    - Libvirt
    - Evolution

Use Case 2: Integrate SPNGO enabled applications with AD: smbclient

- Steps
  - Request TGT with **kinit**
    or
    log in as an AD user
  - Access Windows share with **smbclient**

```
interop01:~ # id
uid=0(root) gid=0(root) groups=0(root)
interop01:~ # kinit demo@AD.DEMO.LAN
Password for demo@AD.DEMO.LAN: <PASSWORD>

interop01:/tmp # klist
Ticket cache: FILE:/tmp/krb5cc_0
Default principal: demo@AD.DEMO.LAN

Valid starting     Expires            Service
principal
03/07/13 10:08:48  03/07/13 20:08:55
krbtgt/AD.DEMO.LAN@AD.DEMO.LAN
        renew until 03/08/13 10:08:48

Kerberos 4 ticket cache: /tmp/tkt0
klist: You have no tickets cached
```

```
interop01:~ # smbclient  -k //win200864/Share
OS=[Windows Server 2008 R2 Standard 7601 Service Pack
1] Server=[Windows Server 2008 R2 Standard 6.1]
smb: \>
smb: \> exit


interop01:~ # klist
Ticket cache: FILE:/tmp/krb5cc_0
Default principal: demo@AD.DEMO.LAN

Valid starting     Expires            Service
principal
03/07/13 10:08:48  03/07/13 20:08:55
krbtgt/AD.DEMO.LAN@AD.DEMO.LAN
        renew until 03/08/13 10:08:48
03/07/13 10:10:16  03/07/13 20:08:55
cifs/win200864@AD.DEMO.LAN
        renew until 03/08/13 10:08:48


Kerberos 4 ticket cache: /tmp/tkt0
klist: You have no tickets cached
interop01:~ #
```

Use Case 2: Integrate SPNGO enabled applications with AD: OpenLDAP ldapsearch

- Steps
  - Request TGT with **kinit**
    or
    log in as an AD user
  - Run **ldapsearch**

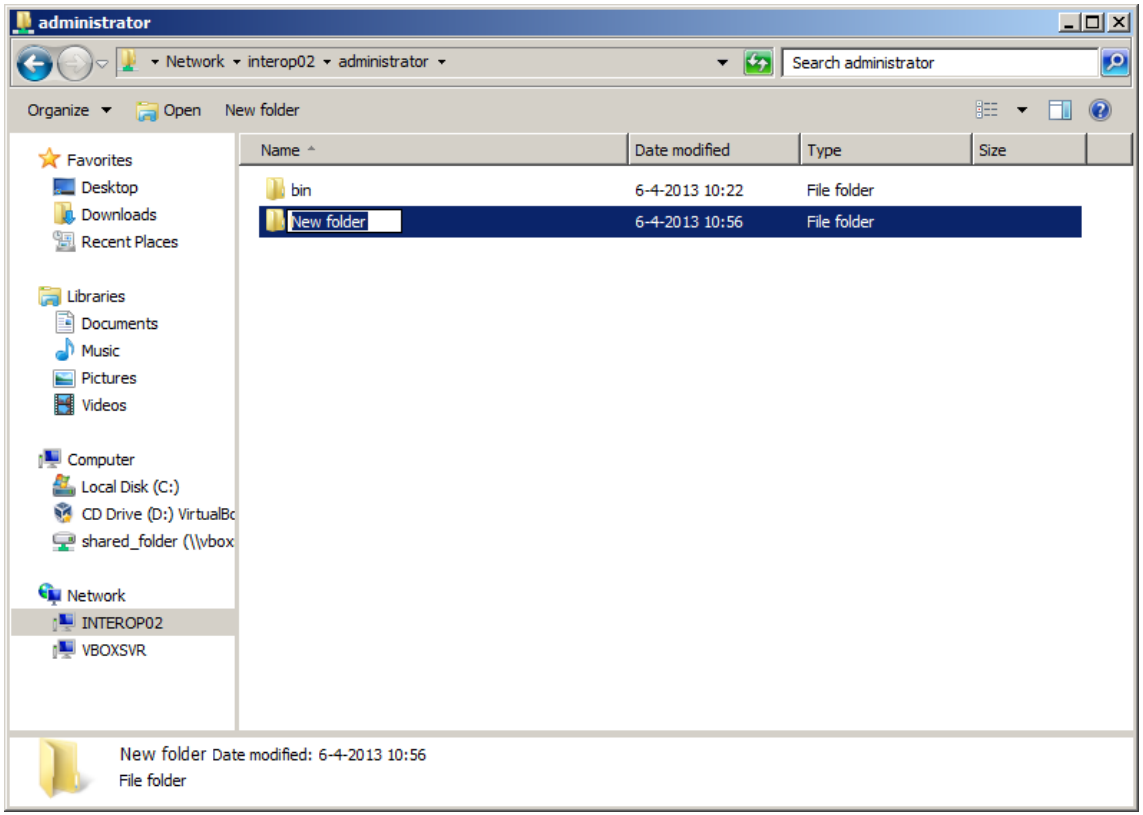
```
interop01:~ # ldapsearch \
     -h win200864
     -b 'cn=Users,dc=ad,dc=demo,dc=lan' \
     -LLL '(givenname=interop)' \
     cn
SASL/GSSAPI authentication started
SASL username: Administrator@AD.DEMO.LAN
SASL SSF: 56
SASL data security layer installed.
dn: CN=Interop
Demo,CN=Users,DC=ad,DC=demo,DC=lan
cn: Interop Demo
interop01:~ #
```

Scenario 1:
Use Case 3: Mount a Windows share

- Mount manually
  - With plain passwords
    ```
    mount -o username=Administrator,password=MYSECRET
    //win200864/Share /mnt/win200864-Share
    ```
  - Using Kerberos
    ```
    kinit Administrator
    mount -o sec=krb5i //win200864/Share /mnt/win200864-share
    ```
- Mount at boot from fstab
  - Credentials file
    ```
    //win200864/Share       /mnt/win200864-Share    cifs
    credentials=/root/.smb.credentials      0 0
    ```
  - See also: `man 8 mount.cifs`

Scenario 1:
Use Case 4: Access a Samba share from Windows

- Transparently access Samba share
  Start → Run → \\interop02<ENTER>



Scenario 2: Integration of Apache with Active Directory

SLES 11 SP2

Role:
Member server
AD:
ad.demo.lan
Hostname:
interop04

Apache

mod_kerb_auth

/

/secure

1

3

2

Active Directory (LDAP)

Kerberos

Windows 2008 R2

Role:
AD Domain Controller
AD domain name:
ad.demo.lan
NT-style domain name:
INTEROP
Hostname:
win200864

4

Firefox

Internet Explorer

Windows 7 (win764.ad.demo.lan)

See more detailled documentation

Scenario 2: Integration of Apache with Active Directory

Configuration steps

- Steps on SLES
  - Join domain
  - Create/amend keytab
  - Configure Apache
- Steps on workstations
  - Configure Integrated Authentication for
    - Firefox
    - Internet Explorer
- Steps on Active Directory
  - Add user "`sles-apache`"
  - Add group "`SLES Web Users`"
  - Add user "Administrator" to "`SLES Web Users`"

See also: HTTP-Based Cross-Platform Authentication by Using the Negotiate Protocol (MSDN)

See also: Interop Demo appliance

Configure Apache for Kerberos authentication

```
file: /etc/apache/conf.d/apache-integration-with-ad.conf

LoadModule auth_kerb_module    /usr/lib64/apache2/mod_auth_kerb.so
LoadModule ldap_module         /usr/lib64/apache2/mod_ldap.so
LoadModule authnz_ldap_module  /usr/lib64/apache2/mod_authnz_ldap.so

<Location /secure>
   # Configuration for auth_kerb
   AuthName "---Restricted Access, please use your Active Directory credentials---"
   AuthType Kerberos
   KrbMethodNegotiate on
   KrbMethodK5Passwd on
   Krb5Keytab /etc/krb5.keytab
   KrbAuthRealms AD.DEMO.LAN
   KrbServiceName HTTP/interop04.ad.demo.lan@AD.DEMO.LAN
   KrbLocalUserMapping On

   # Configuration for authnz_ldap
   AuthLDAPBindDN cn=sles-apache,cn=Users,dc=ad,dc=demo,dc=lan
   AuthLDAPBindPassword SecretPassword
   AuthLDAPURL "ldap://win200864.ad.demo.lan:389/dc=ad,dc=demo,dc=lan?sAMAccountName"
   AuthLDAPGroupAttribute member
   Require ldap-group cn=SLES Web Users,cn=Users,dc=ad,dc=demo,dc=lan
</Location>
```

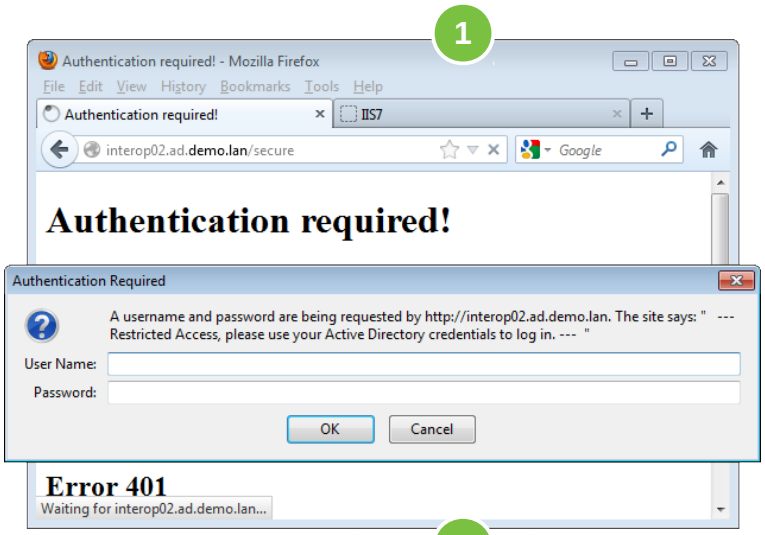
Amend the keytab with HTTP principal

```
# net ads keytab add HTTP -U Administrator
Processing principals to add...
Enter Administrator's password:
# klist -k -e
Keytab name: FILE:/etc/krb5.keytab
KVNO Principal
---- --------------------------------------------------------------------------
   2 host/interop04.ad.demo.lan@AD.DEMO.LAN (DES cbc mode with CRC-32)
   2 host/interop04.ad.demo.lan@AD.DEMO.LAN (DES cbc mode with RSA-MD5)
   2 host/interop04.ad.demo.lan@AD.DEMO.LAN (AES-128 CTS mode with 96-bit SHA-1 HMAC)
   2 host/interop04.ad.demo.lan@AD.DEMO.LAN (AES-256 CTS mode with 96-bit SHA-1 HMAC)
   2 host/interop04.ad.demo.lan@AD.DEMO.LAN (ArcFour with HMAC/md5)
   2 host/interop04@AD.DEMO.LAN (DES cbc mode with CRC-32)
   2 host/interop04@AD.DEMO.LAN (DES cbc mode with RSA-MD5)
   2 host/interop04@AD.DEMO.LAN (AES-128 CTS mode with 96-bit SHA-1 HMAC)
   2 host/interop04@AD.DEMO.LAN (AES-256 CTS mode with 96-bit SHA-1 HMAC)
   2 host/interop04@AD.DEMO.LAN (ArcFour with HMAC/md5)
   2 INTEROP04$@AD.DEMO.LAN (DES cbc mode with CRC-32)
   2 INTEROP04$@AD.DEMO.LAN (DES cbc mode with RSA-MD5)
   2 INTEROP04$@AD.DEMO.LAN (AES-128 CTS mode with 96-bit SHA-1 HMAC)
   2 INTEROP04$@AD.DEMO.LAN (AES-256 CTS mode with 96-bit SHA-1 HMAC)
   2 INTEROP04$@AD.DEMO.LAN (ArcFour with HMAC/md5)
   2 HTTP/interop04.ad.demo.lan@AD.DEMO.LAN (DES cbc mode with CRC-32)
   2 HTTP/interop04.ad.demo.lan@AD.DEMO.LAN (DES cbc mode with RSA-MD5)
   2 HTTP/interop04.ad.demo.lan@AD.DEMO.LAN (AES-128 CTS mode with 96-bit SHA-1 HMAC)
   2 HTTP/interop04.ad.demo.lan@AD.DEMO.LAN (AES-256 CTS mode with 96-bit SHA-1 HMAC)
   2 HTTP/interop04.ad.demo.lan@AD.DEMO.LAN (ArcFour with HMAC/md5)
   2 HTTP/interop04@AD.DEMO.LAN (DES cbc mode with CRC-32)
   2 HTTP/interop04@AD.DEMO.LAN (DES cbc mode with RSA-MD5)
   2 HTTP/interop04@AD.DEMO.LAN (AES-128 CTS mode with 96-bit SHA-1 HMAC)
   2 HTTP/interop04@AD.DEMO.LAN (AES-256 CTS mode with 96-bit SHA-1 HMAC)
   2 HTTP/interop04@AD.DEMO.LAN (ArcFour with HMAC/md5)
#
```

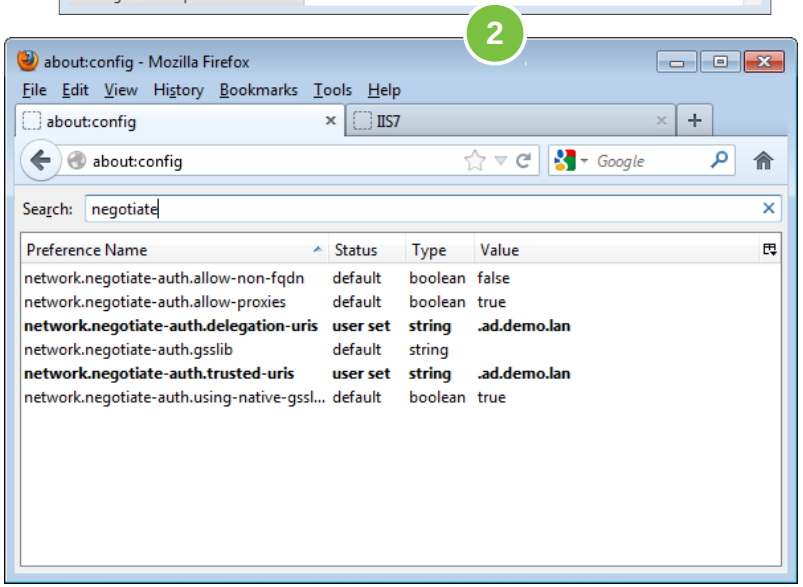
Create separate krb5.keytab for Apache

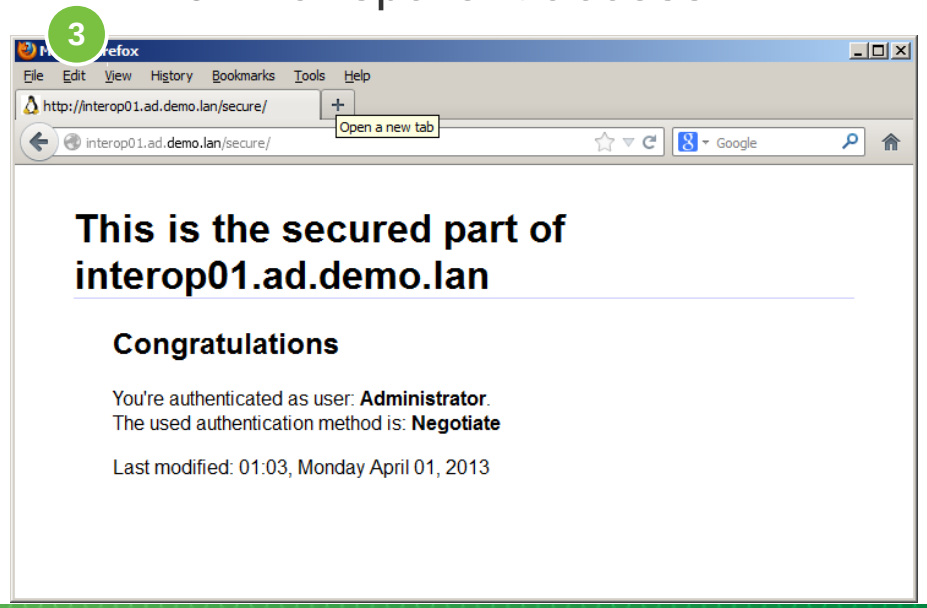
```
interop02:~ # ktutil
ktutil:  list
slot KVNO Principal
---- ---- ---------------------------------------
ktutil:  rkt /etc/krb5.keytab
ktutil:  list
slot KVNO Principal
---- ---- ---------------------------------------
   1    2   host/interop02.ad.demo.lan@AD.DEMO.LAN
...
  16    2   HTTP/interop02.ad.demo.lan@AD.DEMO.LAN
...
  25    2               HTTP/interop02@AD.DEMO.LAN
ktutil: delent 1 # repeat sufficient nr. of times to get rid of all but HTTP entries
Ktutil: wkt /etc/apache2/conf.d/apache2-krb5.keytab

# klist -k -e /etc/apache2/conf.d/apache2-krb5.keytab
Keytab name: FILE:/etc/apache2/conf.d/apache2-krb5.keytab
KVNO Principal
---- ---------------------------------------------------------------------------
   2 HTTP/interop02.ad.demo.lan@AD.DEMO.LAN (DES cbc mode with CRC-32)
   2 HTTP/interop02.ad.demo.lan@AD.DEMO.LAN (DES cbc mode with RSA-MD5)
   2 HTTP/interop02.ad.demo.lan@AD.DEMO.LAN (AES-128 CTS mode with 96-bit SHA-1 HMAC)
   2 HTTP/interop02.ad.demo.lan@AD.DEMO.LAN (AES-256 CTS mode with 96-bit SHA-1 HMAC)
   2 HTTP/interop02.ad.demo.lan@AD.DEMO.LAN (ArcFour with HMAC/md5)
   2 HTTP/interop02@AD.DEMO.LAN (DES cbc mode with CRC-32)
   2 HTTP/interop02@AD.DEMO.LAN (DES cbc mode with RSA-MD5)
   2 HTTP/interop02@AD.DEMO.LAN (AES-128 CTS mode with 96-bit SHA-1 HMAC)
   2 HTTP/interop02@AD.DEMO.LAN (AES-256 CTS mode with 96-bit SHA-1 HMAC)
   2 HTTP/interop02@AD.DEMO.LAN (ArcFour with HMAC/md5)
#
```

Configure Firefox for Integrated Authentication



- Firefox is by default not enabled for the “Negotiate” authentication
  - 1: Negotiate not enabled
  - 2: Enable Negotiate
  - 3: Transparent access!

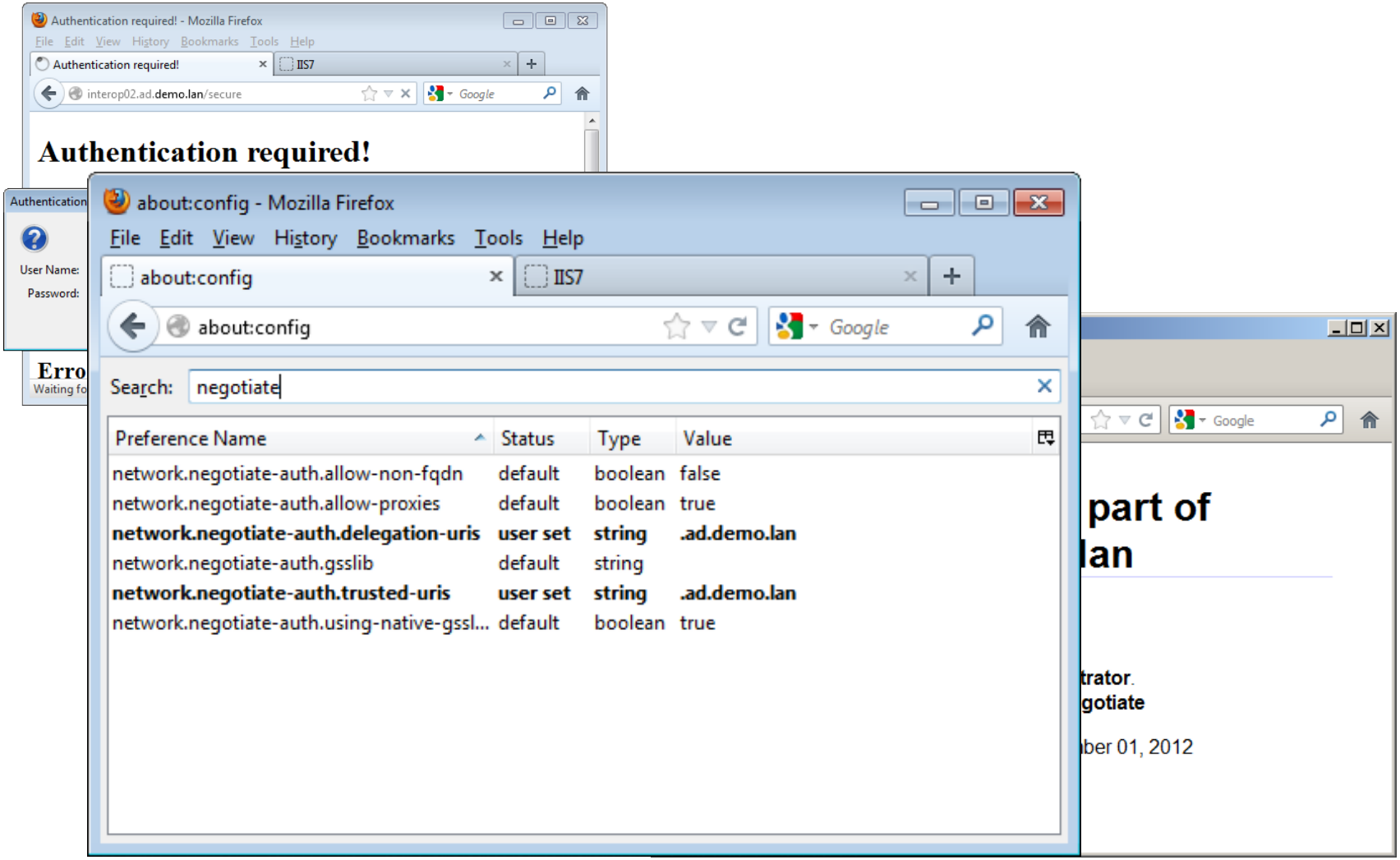




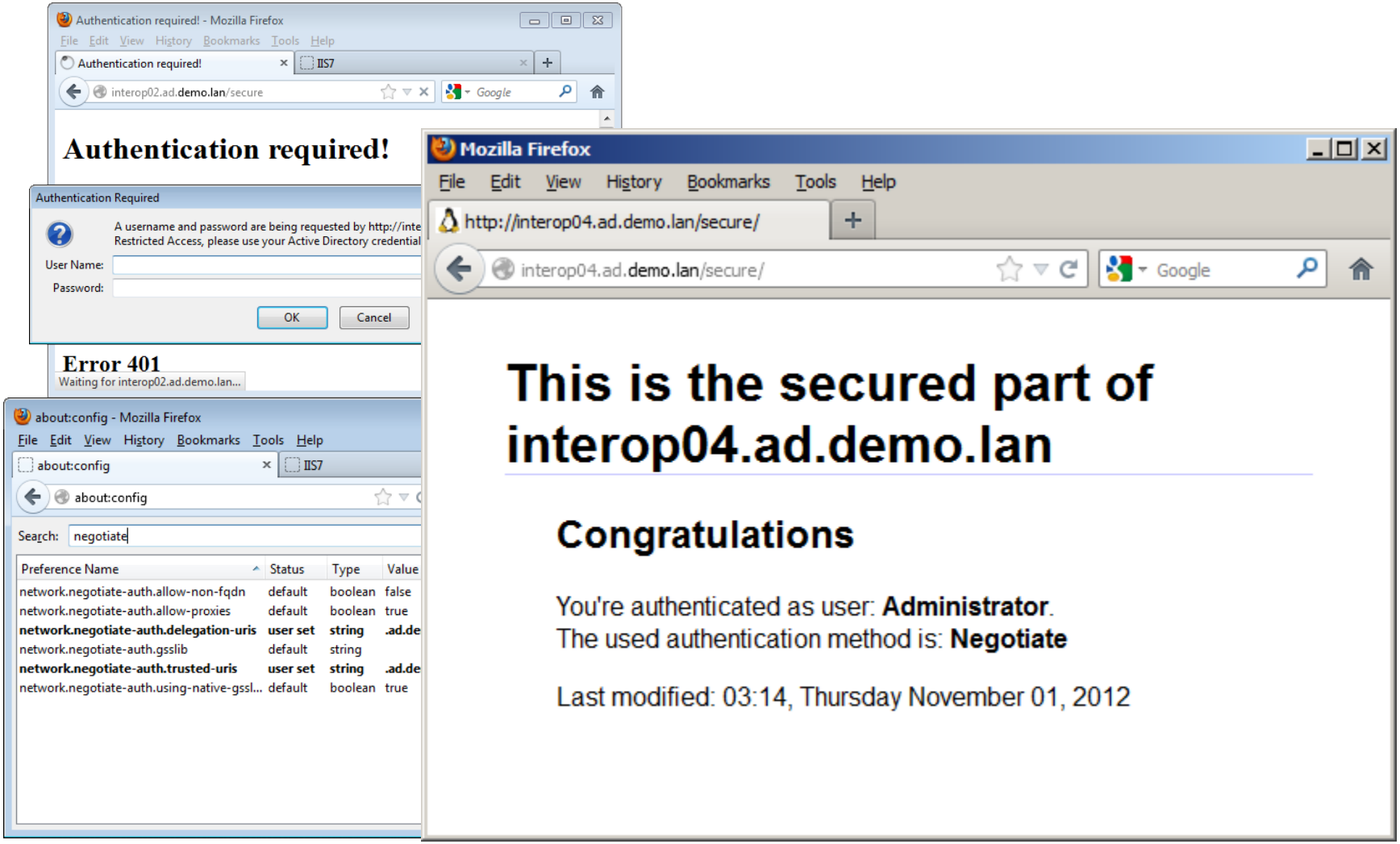
Example HTTP request header using SPNEGO

```
GET /secure/ HTTP/1.1
Host: interop01.ad.demo.lan
User-Agent: Mozilla/5.0 (Windows NT 6.1; WOW64; rv:18.0) Gecko/20100101
Firefox/18.0
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8
Accept-Language: en-US,en;q=0.5
Accept-Encoding: gzip, deflate
Connection: keep-alive
If-Modified-Since: Mon, 11 Mar 2013 13:37:53 GMT
If-None-Match: "b75e-db-4d7a6479f2e40"
Cache-Control: max-age=0, max-age=0
Authorization: Negotiate YIIGugYGKwYBBQUCoIIGrjCCBqqgMDAuB ...
```

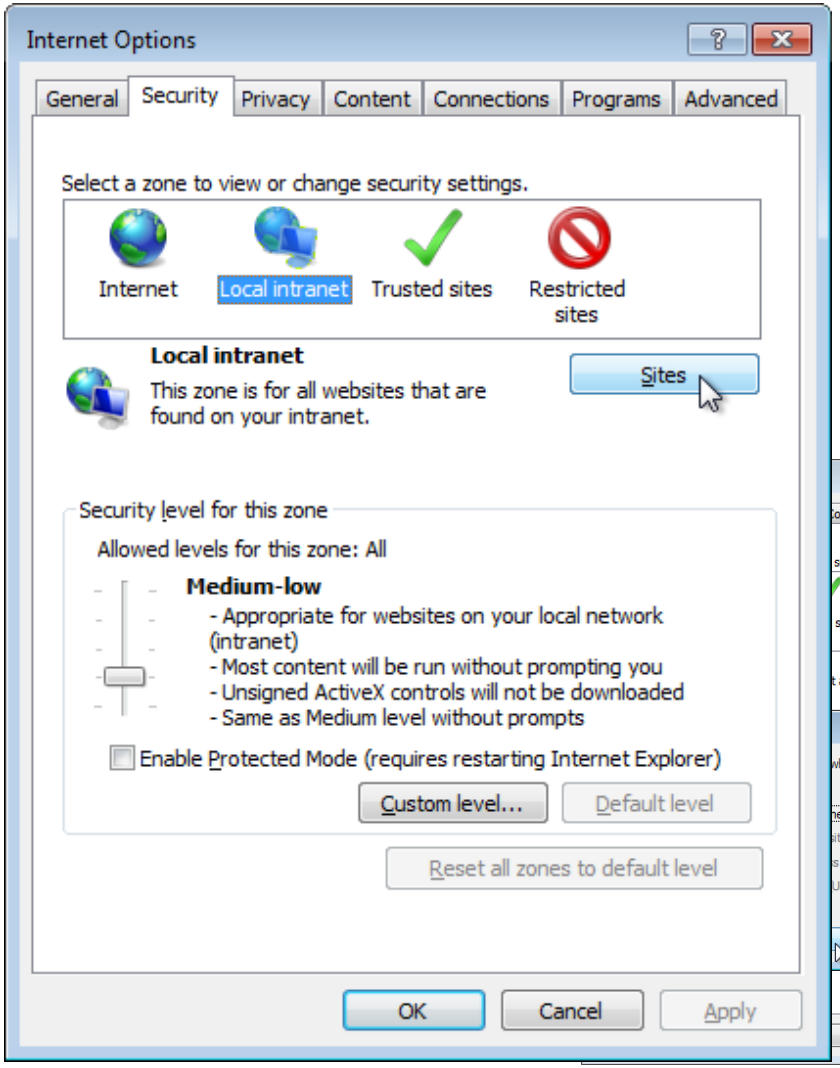
Configure Firefox for Integrated Authentication



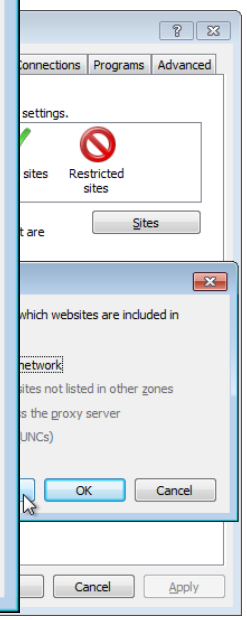
Configure Firefox for Integrated Authentication

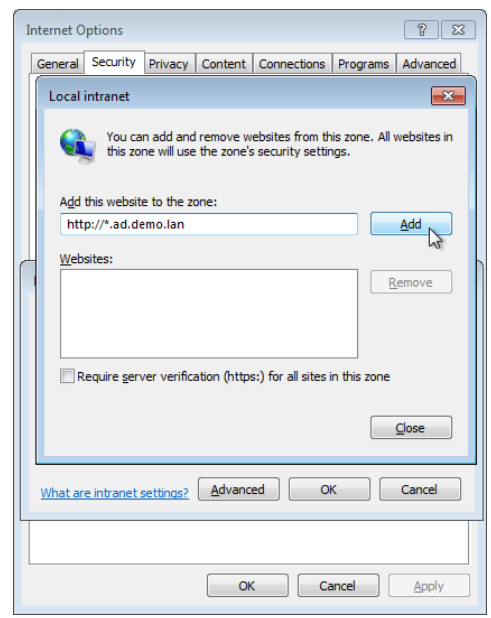


Configure IE for Integrated Authentication

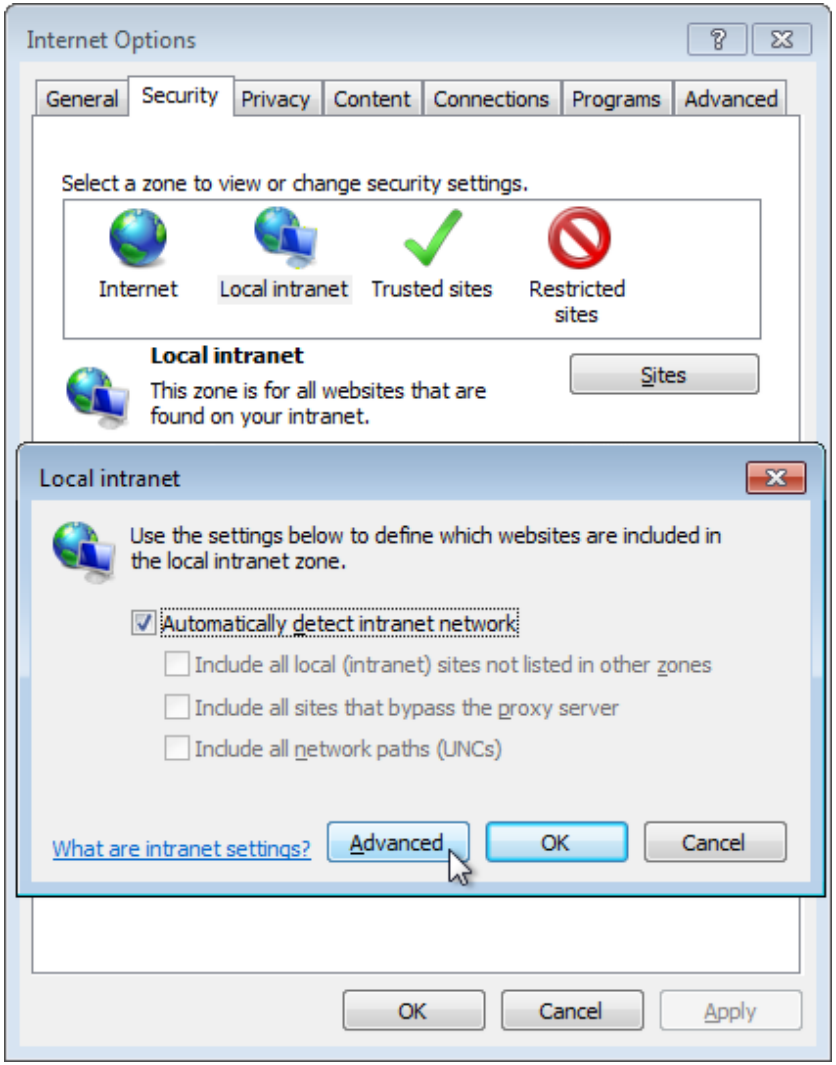


- IE is by default not enabled for the "Negotiate" authentication





Configure IE for Integrated Authentication



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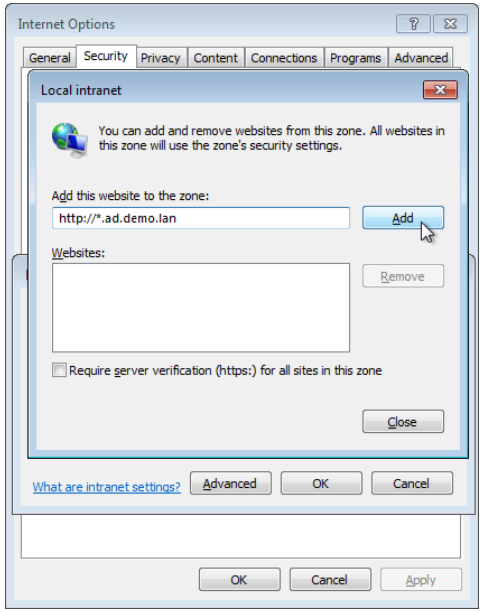
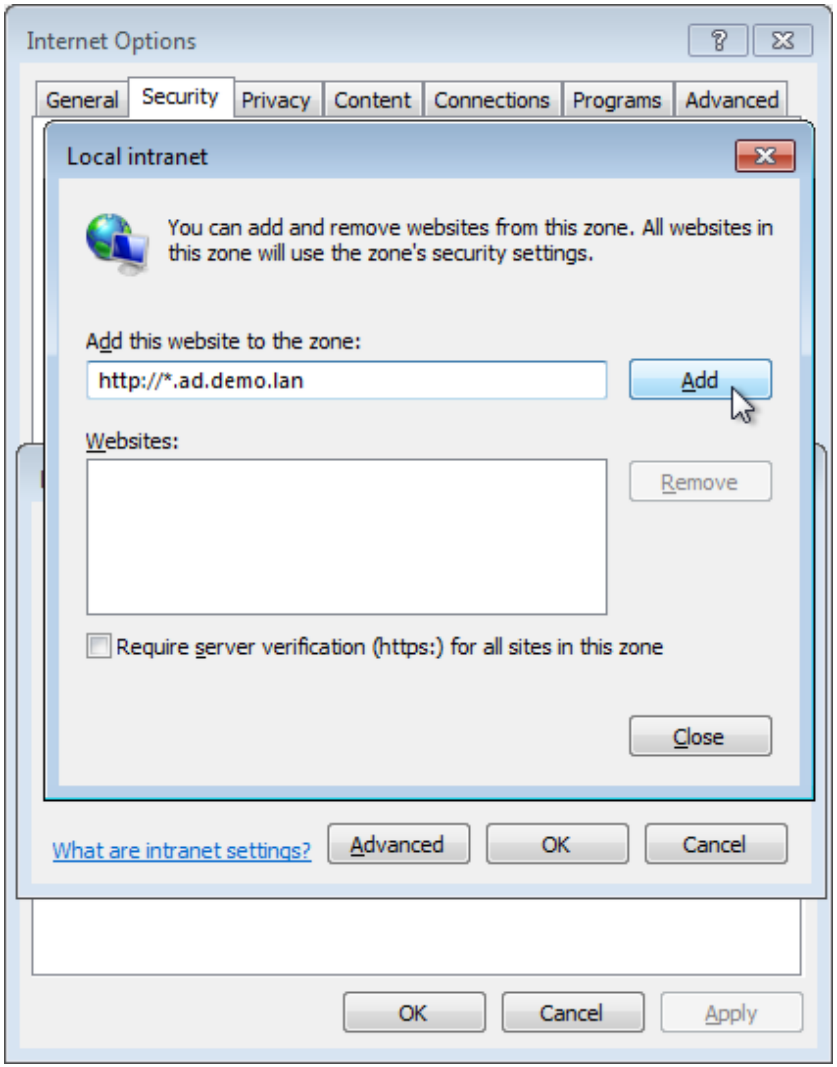


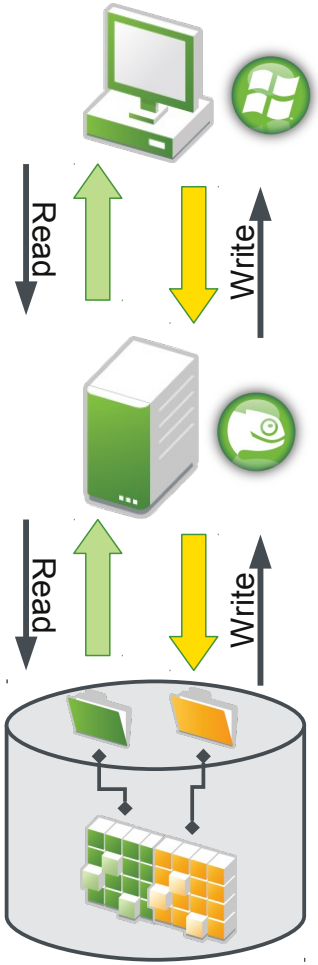
Configure IE for Integrated Authentication



Bleeding Edge Samba 4

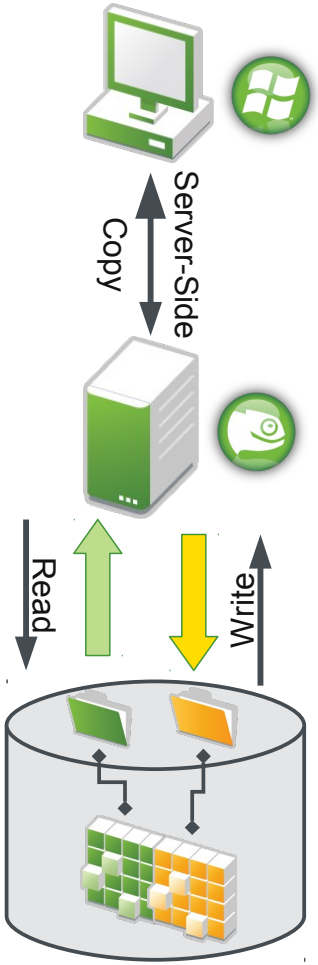
With thanks to David Disseldorp, Samba Team

Traditional Copy



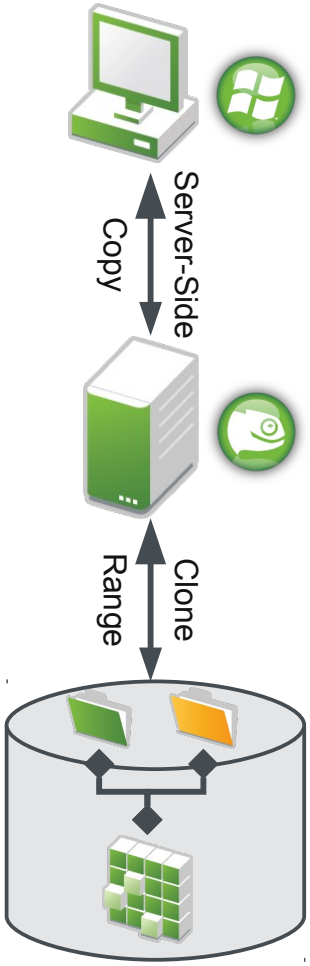
- File data takes disk and network round-trips
- Duplicate data stored on disk

Server-Side Copy



- Network round-trip avoided
- Server copies file data locally
- Duplicate data stored on disk

Btrfs Enhanced Server-Side Copy



- Data avoids network **and** disk round-trips
- No duplication of file data
- Ideal for hypervisor based workloads

Prototype Samba implementation of “Recovery Point”

Features

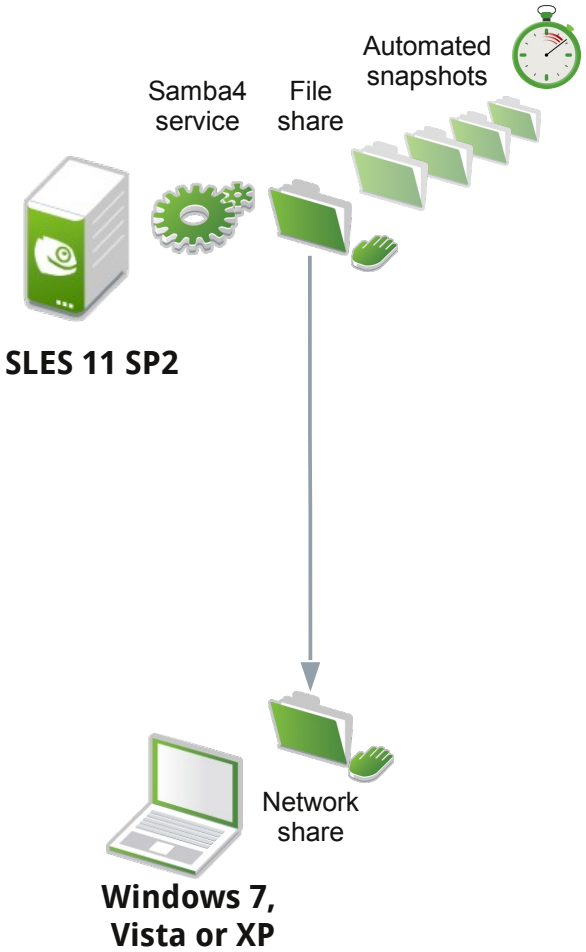
- Through integration of Btrfs, Snapper and Samba, SLES 11 SP2 is providing a file share
- Automatic snapshots create by Snapper provide “Recovery Points” for files
- Through Windows Explorer clients may access older versions of a file

Technology components

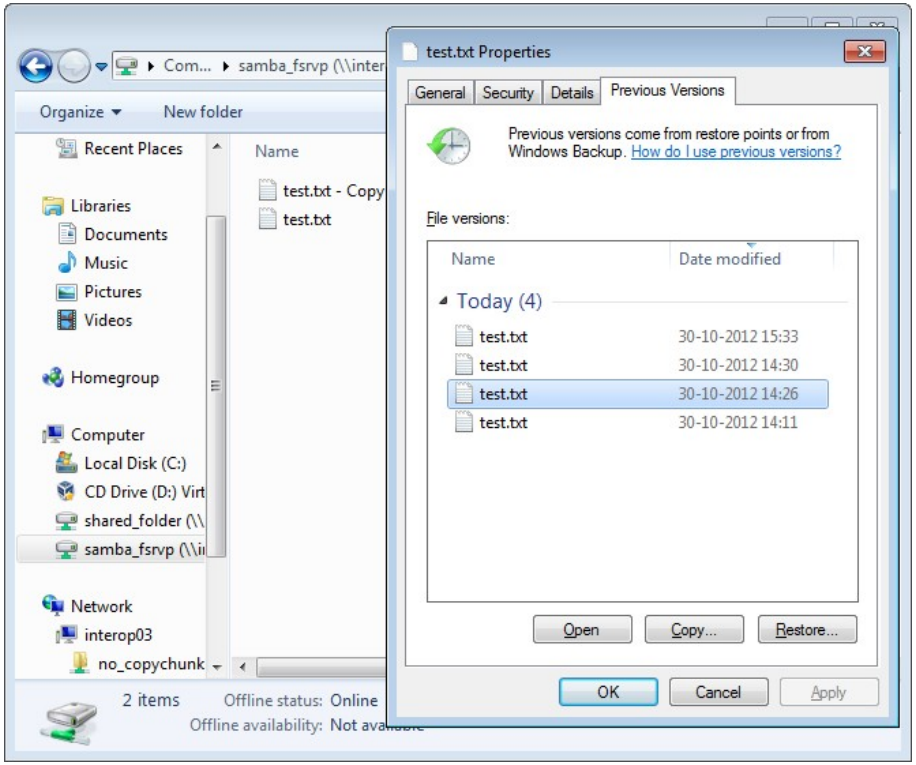
- SLES 11 SP2
  - Btrfs and Snapper(prototype)
  - Samba 4(prototype)
- Windows XP and 7

See also: “Bleeding Edge Samba and Snapper” appliance

Prototype Samba implementation of “Recovery Point”



- Automatic snapshots by Snapper
- Previous versions of “test.txt” in Explorer
- File “test.txt” is changed
- File “test.txt” is created



Questions

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