Mounting root file system via SMB (cifs.ko)

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The CONFIG_CIFS_ROOT option enables experimental root file system support over the SMB protocol via cifs.ko.

It introduces a new kernel command-line option called 'cifsroot=' which will tell the kernel to mount the root file system over the network by utilizing SMB or CIFS protocol.

In order to mount, the network stack will also need to be set up by using 'ip=' config option. For more details, see Documentation/admin-guide/nfs/nfsroot.rst.

A CIFS root mount currently requires the use of SMB1+UNIX Extensions which is only supported by the Samba server. SMB1 is the older deprecated version of the protocol but it has been extended to support POSIX features (See [1]). The equivalent extensions for the newer recommended version of the protocol (SMB3) have not been fully implemented yet which means SMB3 doesn't support some required POSIX file system objects (e.g. block devices, pipes, sockets).

As a result, a CIFS root will default to SMB1 for now but the version to use can nonetheless be changed via the 'vers=' mount option. This default will change once the SMB3 POSIX extensions are fully implemented.

Server configuration

To enable SMB1+UNIX extensions you will need to set these global settings in Samba smb.conf:

```
[global]
server min protocol = NT1
unix extension = yes        # default
```

Kernel command line

```
root=/dev/cifs
```

This is just a virtual device that basically tells the kernel to mount the root file system via SMB protocol.

```
cifsroot=//<server-ip>/<share>[,options]
```

Enables the kernel to mount the root file system via SMB that are located in the <server-ip> and <share> specified in this option.

The default mount options are set in fs/cifs/cifsroot.c.

server-ip
: IPv4 address of the server.

share
: Path to SMB share (rootfs).

options
: Optional mount options. For more information, see mount.cifs(8).

Examples

Export root file system as a Samba share in smb.conf file:

```
...
[linux]
        path = /path/to/rootfs
        read only = no
        guest ok = yes
        force user = root
        force group = root
        browseable = yes
        writeable = yes
        admin users = root
        public = yes
        create mask = 0777
        directory mask = 0777
...
```

Restart smb service:

```
# systemctl restart smb
```

Test it under QEMU on a kernel built with CONFIG_CIFS_ROOT and CONFIG_IP_PNP options enabled:

```
# qemu-system-x86_64 -enable-kvm -cpu host -m 1024 \
```

```
    -kernel /path/to/linux/arch/x86/boot/bzImage -nographic \
    -append "root=/dev/cifs rw ip=dhcp cifsroot=//10.0.2.2/linux,username=foo,password=bar console=ttyS0 3"
```

1: https://wiki.samba.org/index.php/UNIX_Extensions