Using NFS with Recent Linux Distros

Hallelujah! I finally solved a problem with Linux NFS that's been bugging me for about a year and a half. It first showed up when I tried to use Fedora 20 for my Embedded Linux classes. I stuck with Fedora 17 well past its support cutoff because of this. Recently, I decided to try CentOS 7 because it has a much longer revision cycle. Same problem.

When I tried to mount a root file system on the target board over NFS, the client would report things like "Permission denied", "No path to host", or "Connection refused". I thought it was an NFS problem because the command service nfs-server status returned (among other things):

    Active: active (exited)

which led me to believe that NFS wasn't really running.

Turns out it is. This is the "new normal" for NFS. The real problem is that in newer Linux distros, you apparently can't just turn off the firewall. You have to configure it. You have to explicitly "allow" all of the network ports that the various NFS services use.

That's all well and good. Most distros have a graphical tool for editing firewall rules. But there's one more wrinkle. Some of the ports for NFS services are allocated dynamically and randomly by default. That makes it a little hard to create firewall rules for specific ports.

Fortunately, you can make the ports static by editing the file /etc/sysconfig/nfs. The CentOS 7 version of nfs already has a couple of lines that start the process:

    # TCP port rpc.lockd should listen on.
    #LOCKD_TCPPORT=32803
   # UDP port rpc.lockd should listen on.
    #LOCKD_UDPPORT=32769

Uncomment the lines that start "#LOCKD". Then add the following immediately after that:

    # Port rpc.mountd should listen on.
    MOUNTD_PORT=20048
    # Port rquotad should listen on.
    RQUOTAD_PORT=875
    # Port rpc.statd should listen on.
    STATD_PORT=662
    # Outgoing port statd should used. The default is port is random
    STATD_OUTGOING_PORT=2020

The first two numbers came from my system, the last two came from the blog post that set me straight:
http://www.cyberciti.biz/faq/centos-fedora-rhel-iptables-open-nfs-server-ports/

Now then you need to go into firewall setup and enable all of these ports. Here's what my resulting firewall dialog looks like:
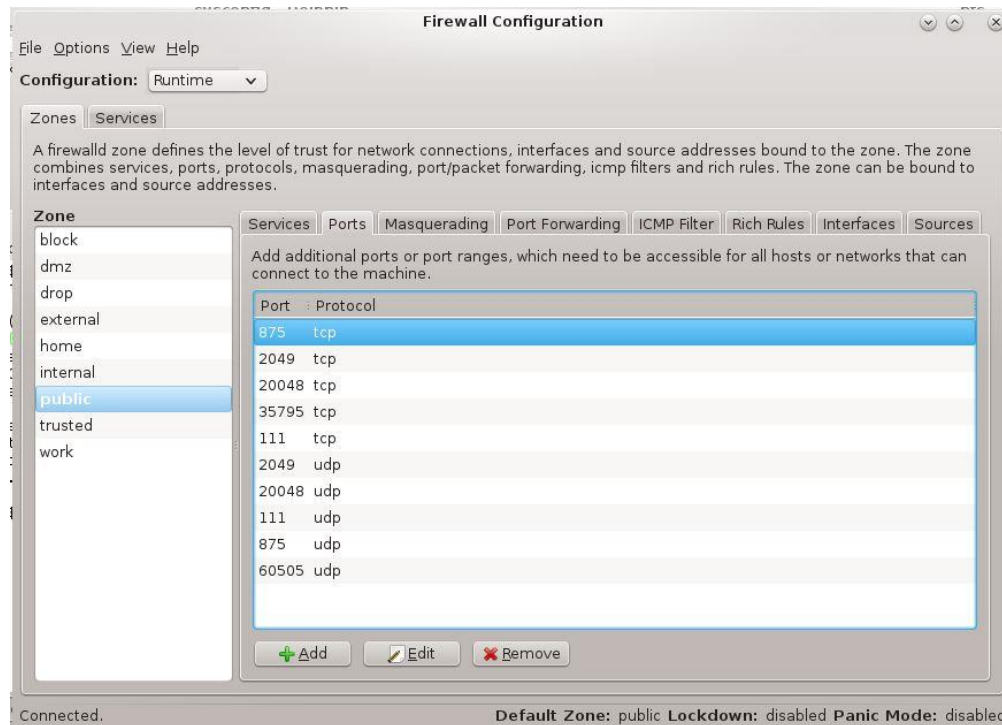
Port 2049 is used by NFS itself and, I believe, port 111 is used by RPC, the Remote Procedure Call mechanism.

The above-referenced blog post also references iptables. Fortunately I found that I didn't have to mess with iptables since they're an incredibly obscure phenomenon.

Once you've made these changes, restart your system. You should then find that NFS file systems mount correctly.

<soapbox> It is my personal opinion that mounting NFS file systems has gotten way too complicated. If there are good security reasons why this complexity is necessary, then there should be tools, preferably graphical, that wrap this complexity along with decent documentation that explains it.

Did I say decent documentation? For Open Source code? What was I thinking? Hey, if there'd been decent documentation it wouldn't have taken me a year and a half to figure it out.<!soapbox>