NAME

perlsynology - Perl 5 on Synology DSM systems

DESCRIPTION

Synology manufactures a vast number of Network Attached Storage (NAS) devices that are very popular in large organisations as well as small businesses and homes.

The NAS systems are equipped with Synology Disk Storage Manager (DSM), which is a trimmed-down Linux system enhanced with several tools for managing the NAS. There are several flavours of hardware: Marvell Armada (ARMv5tel, ARMv7l), Intel Atom (i686, x86_64), Freescale QorIQ (PPC), and more. For a full list see the Synology FAQ <https://kb.synology.com/en-global/DSM/tutorial/What_kind_of_CPU_does_my_NAS_have>.

Since it is based on Linux, the NAS can run many popular Linux software packages, including Perl. In fact, Synology provides a ready-to-install package for Perl, depending on the version of DSM the installed perl ranges from 5.8.6 on DSM-4.3 to 5.24.0 on DSM-6.1.

There is an active user community that provides many software packages for the Synology DSM systems; at the time of writing this document they provide Perl version 5.24.1.

This document describes various features of Synology DSM operating system that will affect how Perl 5 (hereafter just Perl) is configured, compiled and/or runs. It has been compiled and verified by Johan Vromans for the Synology DS413 (QorIQ), with feedback from H.Merijn Brand (DS213, ARMv5tel and RS815, Intel Atom x64).

Setting up the build environment

DSM 5

As DSM is a trimmed-down Linux system, it lacks many of the tools and libraries commonly found on Linux. The basic tools like sh, cp, rm, etc. are implemented using BusyBox <https://en.wikipedia.org/wiki/BusyBox>.

⊕   Using your favourite browser open the DSM management page and start the Package Center.

⊕   If you want to smoke test Perl, install "Perl".

⊕   In Settings, add the following Package Sources:

    https://www.cphub.net
    http://packages.quadrat4.de

⊕   Still in Settings, in Channel Update, select Beta Channel.

⊕   Press Refresh. In the left panel the item "Community" will appear. Click it. Select "Bootstrap Installer Beta" and install it.

⊕   Likewise, install "iPKGui Beta".

      The application window should now show an icon for iPKGui.

⊕   Start iPKGui. Install the packages "make", "gcc" and "coreutils".

      If you want to smoke test Perl, install "patch".

The next step is to add some symlinks to system libraries. For example, the development software expect a library "libm.so" that normally is a symlink to "libm.so.6". Synology only provides the latter and not the symlink.

Here the actual architecture of the Synology system matters. You have to find out where the gcc libraries have been installed. Look in /opt for a directory similar to arm-none-linux-gnueab or powerpc-linux-gnuspe. In the instructions below I'll use powerpc-linux-gnuspe as an example.

⊕   On the DSM management page start the Control Panel.

⊕   Click Terminal, and enable SSH service.

⊕   Close Terminal and the Control Panel.

⊕   Open a shell on the Synology using ssh and become root.

⊕   Execute the following commands:

```
cd /lib
ln -s libm.so.6 libm.so
ln -s libcrypt.so.1 libcrypt.so
ln -s libdl.so.2 libdl.so
cd /opt/powerpc-linux-gnuspe/lib  (or
                  /opt/arm-none-linux-gnueabi/lib)
ln -s /lib/libdl.so.2 libdl.so
```

WARNING: When you perform a system software upgrade, these links will disappear and need to be

re-established.

DSM 6

Using iPkg has been deprecated on DSM 6, but an alternative is available for DSM 6: entware/opkg.
For instructions on how to use that, please read Install Entware-ng on Synology NAS
<https://github.com/Entware-ng/Entware-ng/wiki/Install-on-Synology-NAS>

That sadly does not (yet) work on QorIQ. At the moment of writing, the supported architectures are
armv5, armv7, mipsel, wl500g, x86_32, and x86_64. Check here <https://pkg.entware.net/binaries/>
for supported platforms.

Entware-ng comes with a precompiled 5.24.1 (June 2017) that allowes building shared XS code. Note
that this installation does **not** use a site_perl folder. The available "cpan" works. If all required
development packages are installed too, also for XS.

Compiling Perl 5

When the build environment has been set up, building and testing Perl is straightforward. The only
thing you need to do is download the sources as usual, and add a file Policy.sh as follows:

```
# Administrivia.
perladmin="your.email@goes.here"

# Install Perl in a tree in /opt/perl instead of /opt/bin.
prefix=/opt/perl

# Select the compiler. Note that there is no 'cc' alias or link.
cc=gcc

# Build flags.
ccflags="-DDEBUGGING"

# Library and include paths.
libpth="/lib"
locincpth="/opt/include"
loclibpth="/lib"
```

You may want to create the destination directory and give it the right permissions before installing,
thus eliminating the need to build Perl as a super user.

In the directory where you unpacked the sources, issue the familiar commands:

    ./Configure -des
    make
    make test
    make install

Known problems
Configure

No known problems yet

Build

Error message "No error definitions found".
    This error is generated when it is not possible to find the local definitions for error codes, due to
    the uncommon structure of the Synology file system.

    This error was fixed in the Perl development git for version 5.19, commit
    7a8f1212e5482613c8a5b0402528e3105b26ff24.

Failing tests

ext/DynaLoader/t/DynaLoader.t
    One subtest fails due to the uncommon structure of the Synology file system. The file */lib/glibc.so*
    is missing.

    WARNING: Do not symlink */lib/glibc.so.6* to */lib/glibc.so* or some system components will start
    to fail.

Smoke testing Perl 5
If building completes successfully, you can set up smoke testing as described in the Test::Smoke
documentation.

For smoke testing you need a running Perl. You can either install the Synology supplied package for
Perl 5.8.6, or build and install your own, much more recent version.

Note that I could not run successful smokes when initiated by the Synology Task Scheduler. I resorted
to initiating the smokes via a cron job run on another system, using ssh:

ssh nas1 wrk/Test-Smoke/smoke/smokecurrent.sh

Local patches

When local patches are applied with smoke testing, the test driver will automatically request regeneration of certain tables after the patches are applied. The Synology supplied Perl 5.8.6 (at least on the DS413) **is NOT capable** of generating these tables. It will generate opcodes with bogus values, causing the build to fail.

You can prevent regeneration by adding the setting

 'flags' => 0,

to the smoke config, or by adding another patch that inserts

 exit 0 if $] == 5.008006;

in the beginning of the "regen.pl" program.

Adding libraries

The above procedure describes a basic environment and hence results in a basic Perl. If you want to add additional libraries to Perl, you may need some extra settings.

For example, the basic Perl does not have any of the DB libraries (db, dbm, ndbm, gdsm). You can add these using iPKGui, however, you need to set environment variable LD_LIBRARY_PATH to the appropriate value:

 LD_LIBRARY_PATH=/lib:/opt/lib
 export LD_LIBRARY_PATH

This setting needs to be in effect while Perl is built, but also when the programs are run.

REVISION

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