

DStelnet

A telnet client application on NDS

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Backgrounds

Telnet



Open PCMan, a open source and cross-platform telnet client software and—
PTT Bulletin Board System (PTT), the largest bulletin board system in Taiwan

Telnet (Telecommunication network) is a network protocol used on the Internet or local area network (LAN) connections. Typically, telnet provides access to a command-line interface on a remote machine.

NDS



NDS lite

The **Nintendo DS** (ニンテンドーDS, sometimes abbreviated to **DS** or **NDS**) is a dual-screen handheld game console developed and manufactured by Nintendo. The console has two LCD screens inside—with the bottom one being a touchscreen. The Nintendo DS also features a built-in microphone and supports wireless IEEE 802.11 (Wi-Fi) standards, allowing players to interact with each other within short range (10–30 m, depending on conditions) or online with the Nintendo Wi-Fi Connection service.

Overview of NDS Hardware

Screens

Two separate 3-inch TFT LCD, resolution of 256 x 192 pixels, dimensions of 62 x 46 mm and 77 mm diagonal. The lowermost display of the Nintendo DS is overlaid with a resistive touchscreen, which registers pressure from one point on the screen at a time. There are 6 video modes for main display and 5 modes for sub display. We can assign one screen for main display and another for sub, and the displays of each screen can be exchanged any time.

CPUs

Two ARM processors, an ARM946E-S main CPU and ARM7TDMI co-processor at clock speeds of 67 MHz and 33 MHz respectively. The ARM946E-S CPU processes 3D rendering and the ARM7TDMI processes 2D rendering for DS games and Game boy Advance gameplay.

RAM

4 MB of Mobile RAM.

Some of memory are mapped to video memory and registers, we can direct modify video memory by writing data to specific addresses.

Wi-Fi

Built-in 802.11 Wireless Network Connection (802.11b compatible with WEP encryption support only). It can connect to internet like a PC, it's even possible to run a **FTP server** on

NDS.

Development tools

devkitPro

devkitPro is a tool set for NDS, GBA, PSP, Gamecube programming. It contains gcc/g++ for ARM7/ARM9 CPUs, and tools to create NDS rom files.

libnds

libnds is an open source alternative to Nintendo's commercial SDK for the NDS game console. libnds supports nearly all features of the DS including touch screen, graphic hardware, and Wi-Fi via the dswifi library.

PAlib

A library for NDS development, contains lots of utility functions. We didn't use it in the implementation at all, just use its source for reference.

Emulators

There are many freeware NDS emulators, but none of them have complete features of NDS. No\$gba emulates most part of NDS correctly, but it can't use real network to simulate Wi-Fi of NDS. iDeaS has some bug on video, but it support Wi-Fi emulation. We used No\$gba to test the graphic part and iDeaS for testing network connection.

R4(SDHC) Revolution

R4 is a slot-1 devices for NDS that allows us to run our programs, it use a microSD card for storage. It's easy to use, just copy the programs to SD card and insert card with R4 to NDS, then we can run it.



R4 SDHC

Implementation

Most of sources are written in C/C++, device dependent part are done by using functions in libnds or accessing the memory directly.

Network

At the beginning, we used the wifi functions in the PA library to connect to some sites. It could download a file correctly via HTTP(port 80), but when connecting to a BBS, the recv() call always blocked. Later we found that if we send something before the first recv(), it would work. There might be a bug in dswifi library.

We also wrote a text-mode subroutine for manually connecting to an AP.



Input

A keyboard is implemented on the touch screen for typing site address and browsing BBS.

Text

The screen is so small, if we resize all things to fit the screen, then many words would be unrecognizable, so we decided to use 8x4 font (8x8 for CJK characters). Texts outside the screen can be seen by scrolling.

We have found a bitmap font on internet. It was ttc format, we used FontCreator to extract it to ttf format files, then used Microsoft's Typography tool to extract 8x8 bitmap font. We use windows API to convert the encoding to big5 by functions Windows API and code table in Unicode 補完計畫, and finally convert it to our format(see font_table.c for detail). This font contains Traditional Chinese, Simplified Chinese and Japanese characters, most of these characters in big5 encoding would be displayed correctly.

Graphics

8-bit 512x256 bitmap is used for each display. Resizing and scrolling are done by hardware.

Telnet

We implemented Cursor Control, Scrolling, Erasing Text, Set Display Attributes ... etc for terminal control escape sequences part, most of text on BBS can be displayed correctly.

We also implemented telnet terminal-type option(RFC 1091) and telnet window size option(RFC 1073) for Interpret as Command(IAC) part.



BBSMovie

References

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