M451在FreeRTOS下驅動 DM9051

NuMicro® 32 位系列微控制器範例代碼介紹

文件資訊

代碼簡述	本範例在 FreeRTOS 下，使用 M451 來驅動 DM9051。
BSP 版本	M451BSP_v3.01.003
開發平台	NuTiny-SDK-M451V

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1 功能介紹

1.1 介紹

本範例代碼使用 M451 系列通過 SPI 接口驅動 DM9051，在 FreeRTOS 下實現 uIP/httpd 功能，以及 PC9 閃燈。

1.2 原理

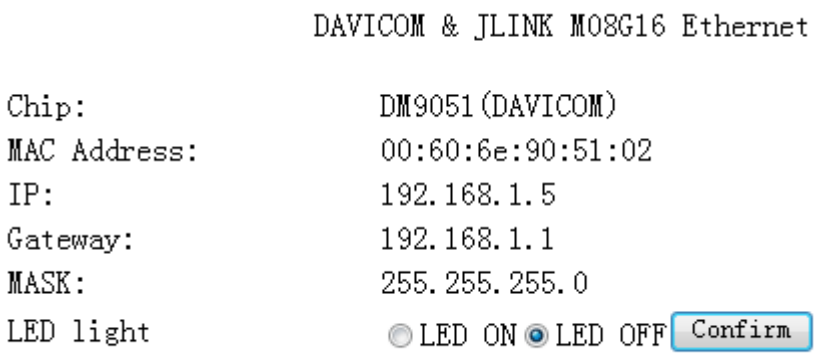
DM9051 是一個高集成和低成本的少管腳數的單芯片快速以太網控制器，具有串行外圍接口(SPI)， 10/100M PHY 和 MAC，以及 16k 字節的 SRAM。低功耗、高性能的工藝接口，支持 3.3V、5V IO 融差。

DM9051 的物理層可以通過 HP Auto-MDIX 與 10Base-T 中的 UTP3、4、5 和 100Base-TX 中的 UTP5 連接。它完全符合 IEEE 802.3u 規範，其自動協商功能將自動配置 DM9051，最大限度地利用其 10M 或 100M 的能力。

DM9051 在 PHY 和 MAC 中支持 IEEE 802.3az，以節省以太網空閒時的功耗。支持 ieee802.3X 全雙工流量控制和半雙工背壓功能，避免與鏈路夥伴丟失以太網數據包。

作爲SPI從機接口支持與CPU的SPI主機接口兼容的SPI時鐘模式0和3。時鐘速度可以高達50Mhz，以配合高速的主SPI。SPI突發命令格式是有效的代碼，可以最小化訪問DM9051內部寄存器和內存中的包數據時的命令開銷。

1.3 執行結果



2 代碼介紹

初始化 DM9051：

```
int32_t DM9051_INIT()
{
    int i, oft, lnk;
    uint32_t value=0;
    DM9051_Configuration();
  /* identfy DM9051   */
  value |= DM9051_Read_Reg(DM9000_VIDH) << 8;
  value |= DM9051_Read_Reg(DM9000_PIDL) << 16;
  value |= DM9051_Read_Reg(DM9000_PIDH) << 24;
  value |= DM9051_Read_Reg(DM9000_VIDL);
  . . . . . .
}
```

uIP 初始化及 IP 地址設置：

```
void vuIP_Task(void *pvParameters)
{
    . . . . . .
    uip_init();
    uip_arp_init(); // Clear arp table.
#ifndef __DHCPC_H__
    // setup the dhcp renew timer the make the first request
    timer_set(&dhcp_timer, CLOCK_SECOND * 600);
    dhcpc_init(&uip_ethaddr, 6);
#else //Fixed IP set
    uip_ipaddr(ipaddr, 192, 168, 1, 5);   //Host IP address
    uip_sethostaddr(ipaddr);
    uip_ipaddr(ipaddr, 192, 168, 1, 1);   //Default Gateway
    uip_setdraddr(ipaddr);
    uip_ipaddr(ipaddr, 255, 255, 255, 0); //Network Mask
    uip_setnetmask(ipaddr);
        . . . . . .
#endif
    httpd_init();
}
```

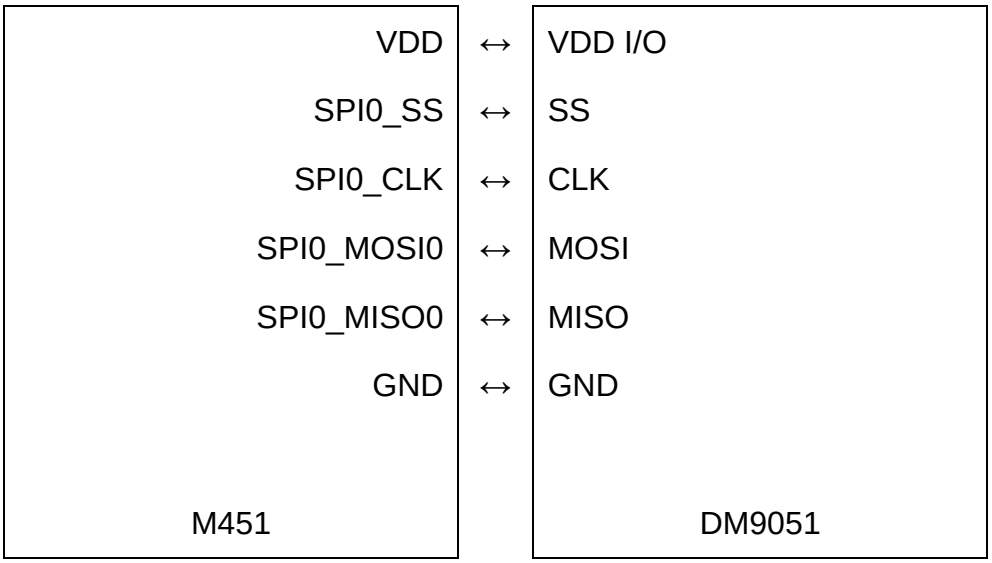
FreeRTOS 兩個任務的建立：

```
    int main( void )
    {
      /* Init System */
      prvSetupHardware();
     /* create task */
     xTaskCreate( vuIP_Task,  "uIP", configMINIMAL_STACK_SIZE * 3, NULL, tskIDLE_PRIORITY +
4, NULL );
     xTaskCreate( vLEDTask,  "LED", configMINIMAL_STACK_SIZE, NULL, tskIDLE_PRIORITY + 1,
NULL );
     printf("FreeRTOS is starting ...\n");
      /* start OS */
      vTaskStartScheduler();
      for(;;);
    }
```

3 軟體與硬體環境

- 軟件環境
  - BSP 版本
    - M451BSP_v3.01.003
  - IDE 版本
    - Keil uVersion4.74
- 硬件環境
  - 電路元件
    - NuTiny-SDK-M451V
    - DM9051
  - 示意圖

M451 通過 SPI 接口驅動 DM9051。



4 目錄資訊

EC_M451_SPI_DM9051_uIP_FreeRTOS_V1.00	
Library	Sample code header and source files
CMSIS	Cortex®Microcontroller Software Interface Standard (CMSIS) V4.5.0 definitions by ARM® Corp.
Device	CMSIS compliant device header file
StdDriver	All peripheral driver header and source files
SampleCode	
ExampleCode	Source file of example code

5 如何執行範例程式

1. 根據目錄資訊章節進入 ExampleCode 路徑中的 KEIL 文件夾，雙擊 M451_SPI_DM9051_uIP_FreeRTOS.uvproj
2. 進入編譯模式接口
   a. 編譯
   b. 下載代碼至記憶體
   c. 進入 / 離開除錯模式
3. 進入除錯模式介面
   a. 執行代碼

6 修訂紀錄

Date	Revision	Description
Apr. 24, 2019	1.00	1. 初始發布.

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