http in UEFI

using libcurl to write network applications

Kimon Berlin,
Master Engineer, HP

presented by

Agenda

Existing file transfer capabilities

cURL and libcurl

Using libcurl in UEFI

Downloading source code

Q&A

File transfers in UEFI

EFI_MTFTP4_PROTOCOL

EFI_MTFTP6_PROTOCOL

EFI_FTP4_PROTOCOL

No proxies – short-haul only

No http?

Can we do better?

About cURL

Command-line tool

Around since 1998

Download/upload data

Supports FTP, FTPS, HTTP, HTTPS, SCP, SFTP, TFTP, LDAP, LDAPS, IMAP, SMTP, more…

IPv4+IPv6, proxies, proxy tunneling, …

http://curl.haxx.se

About libcurl

Very portable library that powers cURL

Blocking and non-blocking transfers

Easy to use

Fast!

Reuses other libraries (e.g. SSL/TLS support)

MIT/X license

Huge user base (>1M DL/year)

Libcurl sample (simple.c)

```c
#include <stdio.h>
#include <curl/curl.h>

int main(void)
{
		CURL *curl;
		CURLcode res;
		static const char *url = "http://15.192.40.23";

		printf ("Downloading from %s\n", url);
		curl = curl_easy_init();
		if (!curl) {
			printf ("curl_easy_init() failed\n");
			return 1;
		}

		curl_easy_setopt(curl, CURLOPT_URL, url);

		/* Perform the request, res will get the return code */
		res = curl_easy_perform(curl);
		/* Check for errors */
		if(res != CURLE_OK)
			fprintf(stderr, "curl_easy_perform() failed: %s\n", curl_easy_strerror(res));

		/* always cleanup */
		curl_easy_cleanup(curl);

		return 0;
}
```

Porting to UEFI

libcurl

libsocket (SocketDxe)

libc

Porting to UEFI: INF

```
[Defines]
  INF_VERSION                     = 0x00010006
  BASE_NAME                       = CurlDemo
  FILE_GUID                       = 3738DDE3-F3A4-45b5-8B52-C7432F31252D
  MODULE_TYPE                     = UEFI_APPLICATION
  VERSION_STRING                  = 0.1
  ENTRY_POINT                     = ShellCEntryLib

#
#  VALID_ARCHITECTURES            = IA32 X64 IPF
#

[Sources]
  CurlDemo.c

[Packages]
  HpNetworkPkg/HpNetworkPkg.dec
  MdePkg/MdePkg.dec

[LibraryClasses]
  CurlLib
  LibNetUtil

[Guids]

[Protocols]

[BuildOptions]
  MSFT:*_*_*_CC_FLAGS = /Od /D_UEFI_ /DCURL_STATICLIB
```

Porting to UEFI: CurlDemo.c

```c
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#include <curl/curl.h>

int main(void)
{
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        static const char *url = "http://15.192.40.23";

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        /* always cleanup */
        curl_easy_cleanup(curl);

        return 0;
}
```
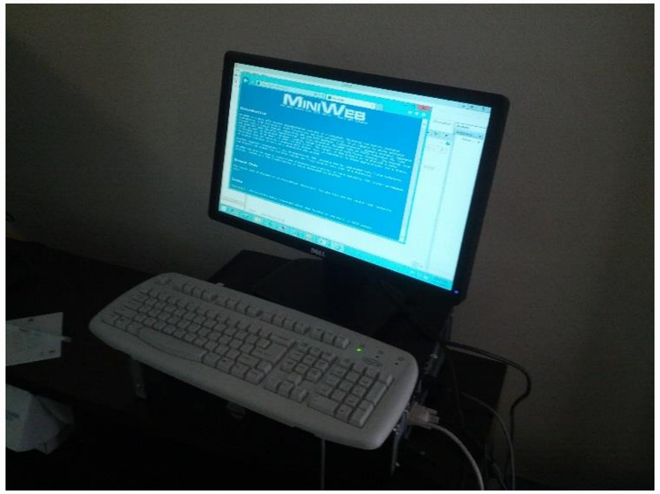
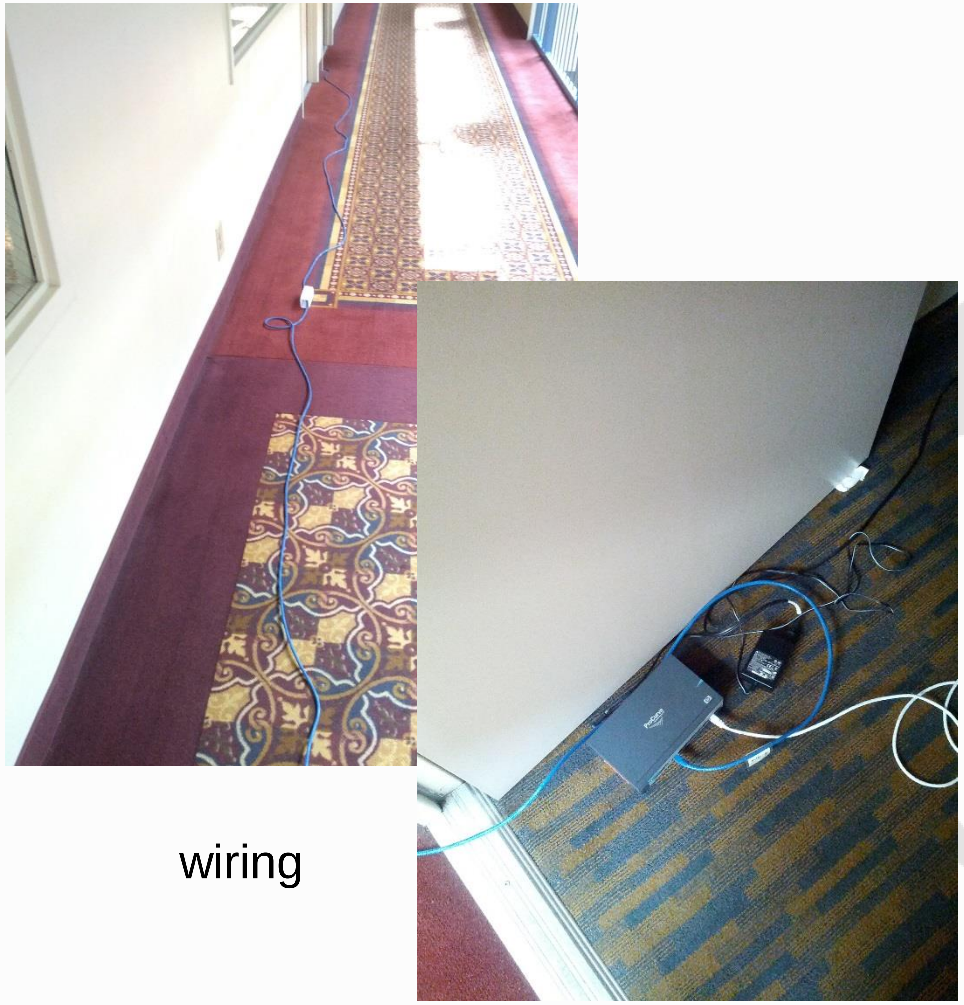

Compiling

Sample: ~170K uncompressed on x64

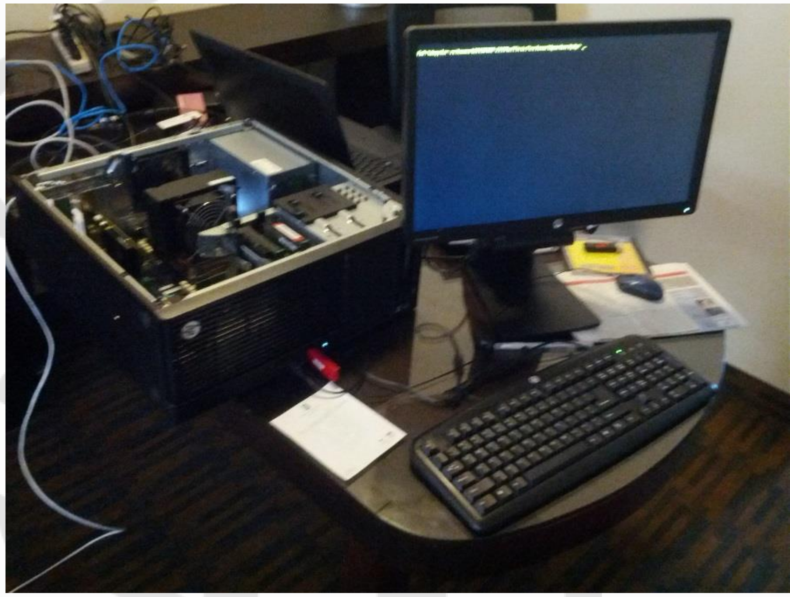
Demo setup



DHCP and http server

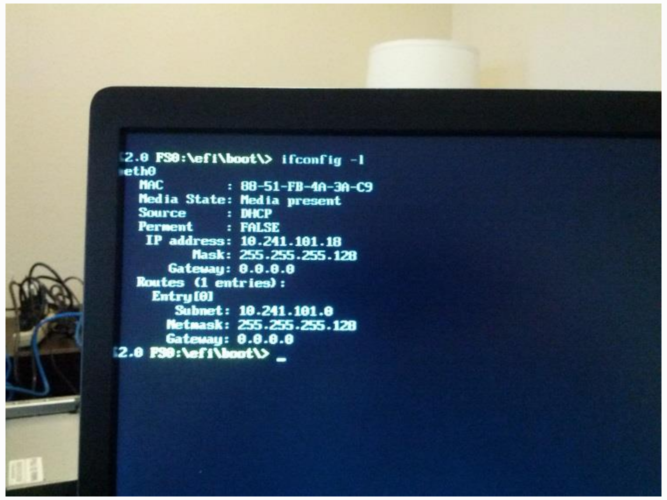


wiring



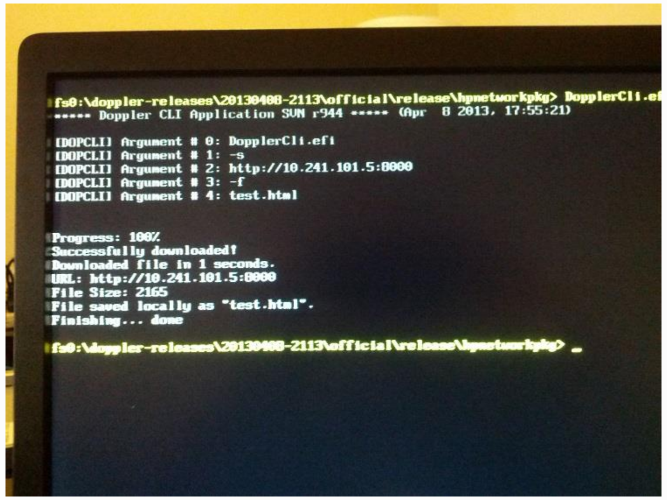
UEFI client

http transfer



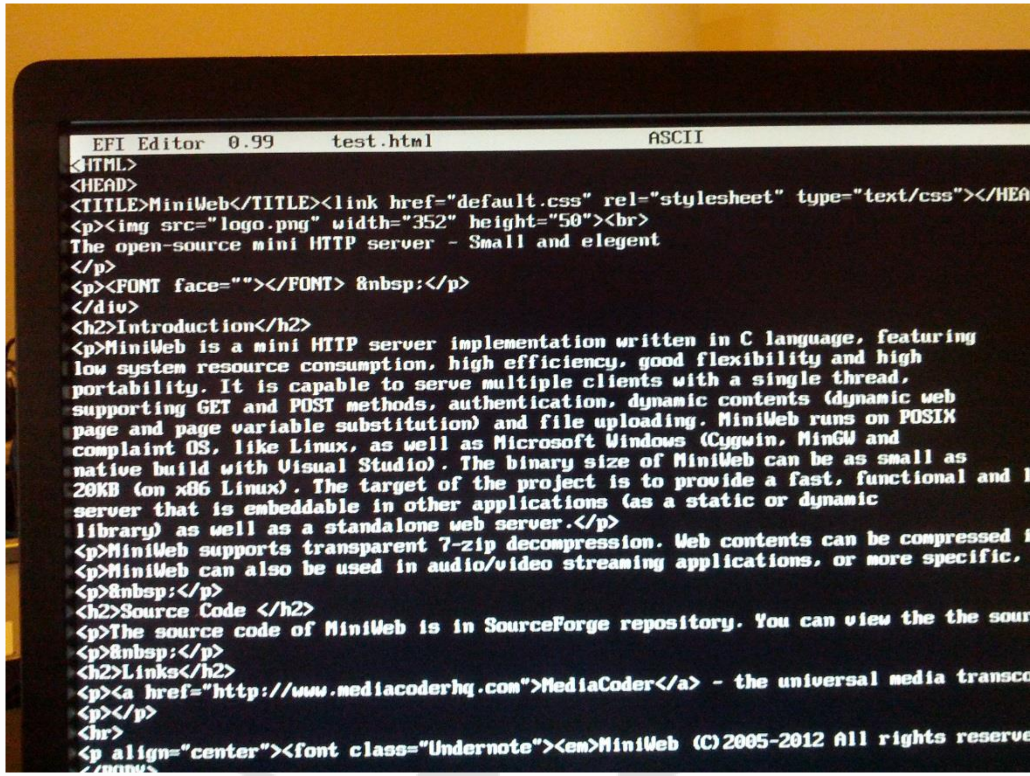
```
2.0 FS0:\efi\boot\> ifconfig -l
eth0
  MAC         : 88-51-FB-4A-3A-C9
  Media State: Media present
  Source      : DHCP
  Perment     : FALSE
   IP address: 10.241.101.18
         Mask: 255.255.255.128
      Gateway: 0.0.0.0
  Routes (1 entries):
    Entry[0]
      Subnet: 10.241.101.0
     Netmask: 255.255.255.128
     Gateway: 0.0.0.0
2.0 FS0:\efi\boot\> _
```

Dhcp config



```
fs0:\doppler-releases\20130408-2113\official\release\hpnetworkpkg> DopplerCli.ef
***** Doppler CLI Application SVN r944 ***** (Apr  8 2013, 17:55:21)

[DOPCLI] Argument # 0: DopplerCli.efi
[DOPCLI] Argument # 1: -s
[DOPCLI] Argument # 2: http://10.241.101.5:8000
[DOPCLI] Argument # 3: -f
[DOPCLI] Argument # 4: test.html


Progress: 100%
Successfully downloaded!
Downloaded file in 1 seconds.
URL: http://10.241.101.5:8000
File Size: 2165
File saved locally as "test.html".
Finishing... done

fs0:\doppler-releases\20130408-2113\official\release\hpnetworkpkg> _
```

http download



```
  EFI Editor  0.99      test.html                        ASCII
<HTML>
<HEAD>
<TITLE>MiniWeb</TITLE><link href="default.css" rel="stylesheet" type="text/css"></HEA
<p><img src="logo.png" width="352" height="50"><br>
The open-source mini HTTP server - Small and elegent
</p>
<p><FONT face=""></FONT> &nbsp;</p>
</div>
<h2>Introduction</h2>
<p>MiniWeb is a mini HTTP server implementation written in C language, featuring
low system resource consumption, high efficiency, good flexibility and high
portability. It is capable to serve multiple clients with a single thread,
supporting GET and POST methods, authentication, dynamic contents (dynamic web
page and page variable substitution) and file uploading. MiniWeb runs on POSIX
complaint OS, like Linux, as well as Microsoft Windows (Cygwin, MinGW and
native build with Visual Studio). The binary size of MiniWeb can be as small as
20KB (on x86 Linux). The target of the project is to provide a fast, functional and
server that is embeddable in other applications (as a static or dynamic
library) as well as a standalone web server.</p>
<p>MiniWeb supports transparent 7-zip decompression. Web contents can be compressed
<p>MiniWeb can also be used in audio/video streaming applications, or more specific,
<p>&nbsp;</p>
<h2>Source Code </h2>
<p>The source code of MiniWeb is in SourceForge repository. You can view the the sour
<p>&nbsp;</p>
<h2>Links</h2>
<p><a href="http://www.mediacoderhq.com">MediaCoder</a> - the universal media transco
<p></p>
<hr>
<p align="center"><font class="Undernote"><em>MiniWeb (C)2005-2012 All rights reserve
```

Html contents!

SSL/TLS

Libcurl works with a dozen libraries

e.g. OpenSSL, GnuTLS, AxTLS

(reminder: TLS is hard. Have you checked your RNG lately?)

Source code

https://svn.code.sf.net/p/libcurledk2/code

Call to action

You can build an http-capable app in five minutes.

Go play!

Ongoing questions: edk2-devel@lists.sourceforge.net

Q&A

Thank You

For more information on the Unified EFI Forum and UEFI Specifications, visit http://www.uefi.org

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