

Project Proposal

Embedded Web Server with SD/MMC File Storage

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Project Abstract

The goal of this project is to convert the Z8 Encore platform into an embedded web server. For this proof of concept, simple HTML files will be stored on an attached SD/MMC card and served over a network connection via the HyperText Transfer Protocol (HTTP). The network interface will be provided by the addition of a NICHolas network interface board from EDTP. The SD/MMC card interface will be provided by the addition of an SD/MMC breakout board from SparkFun. Once assigned a static IP address, the embedded web server will continuously serve the HTML web pages provided on the SD card to any host on the network. For this project, not only will a web server program have to be developed, but support for the network interface card and the SD/MMC specifications will also have to be added to the Z8 platform.

Strategy

Platform: Zilog Z8 Encore chip and development platform.

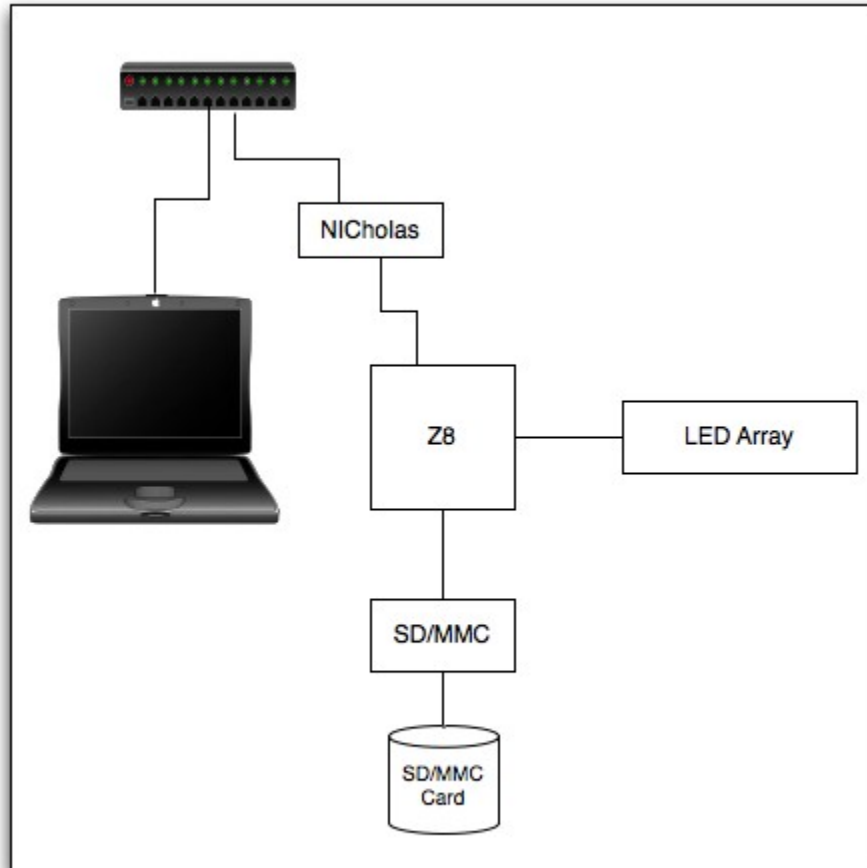
Capabilities: GPIO, Timers, Interrupts.

External: NICHolas network interface, SD/MMC card breakout board. Possible LED Array output.

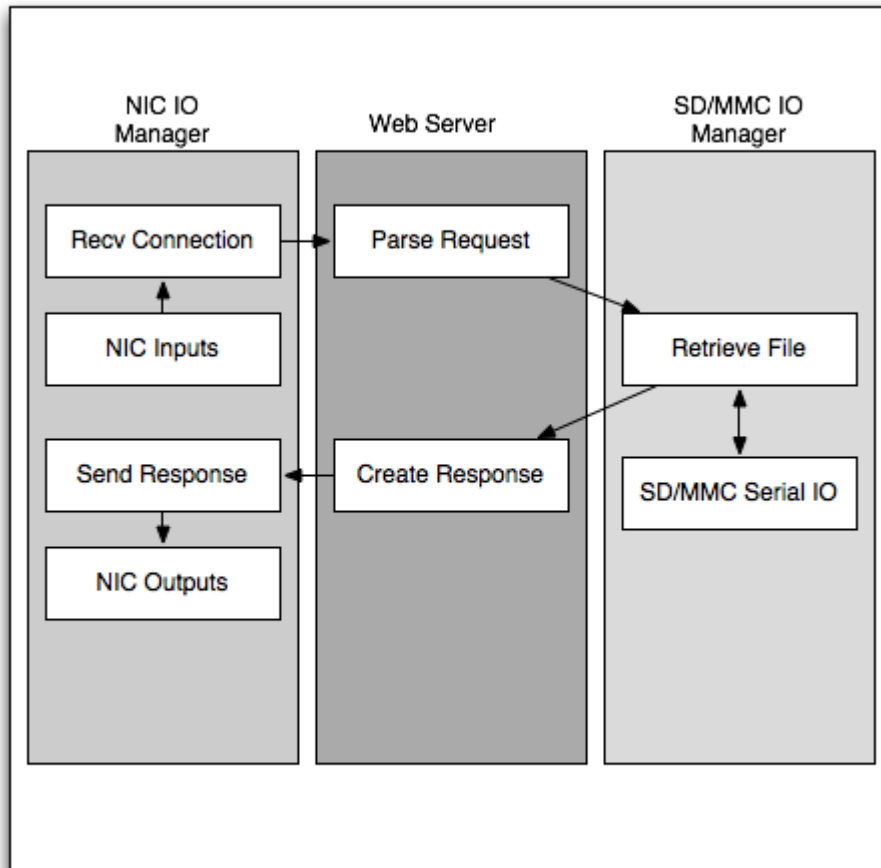
The EDTP NICHolas network interface was selected because of availability through University Course materials, and its use in previous course projects. The EDTP website contains driver source code for the Z8 (though possibly needs to be updated for the current Zilog IDE), and also provides wiring pictures and instructions for connecting the NICHolas board to the Z8 development board. This driver code appears at initial inspection to require some minimal updates for supporting the requirements of project.

The SD/MMC breakout board was chosen for its simplicity and price. SD/MMC was chosen over Compact Flash for the simplicity of its interface, (9 pins vs. 50 pins), and available documentation on pinouts and specifications. This is where the bulk of the new research work will be located for this project. Full support for file reading from the SD/MMC card will need to be developed, and possibly later file writing capabilities can be added.

Development and testing of the software will be done in the Zilog Z8 IDE, and debugging will be conducted using both the serial cable and the simulator software.



Preliminary Hardware Block Diagram



Preliminary Software Block Diagram

Unknowns

Unknowns regarding the EDTP NICHolas network interface:

- Connection example connects to PG on the Z8. Can we connect to something else to still allow use of the LED Arrays?
- Can sample code be altered/updated to be used with current Zilog IDE version?
- How is Serial I/O used to interface with the NICHolas?
- How are interrupts and timers used in the sample code?

Unknowns regarding the SD/MMC interface for file access and transfer:

- Will knowledge/drivers for a FAT 12/16 File System be needed for accessing SD/MMC data?
- How is Serial I/O used to interface with the SD/MMC card?
- How are interrupts and timers used to interface with the SD/MMC card?

Unknowns regarding the Web server program:

- How will the server operate with multiple page requests?
- Should the server support parallel and/or persistent HTTP connections?

Implementation Plan

- Acquire all components.
- Research connectivity of NICHolas and SD/MMC breakout card.
- Connect NICHolas and attempt to run sample code.
- Write network interface driver component based on sample code.
- Write web server component to serve a single static page.
- Connect SD/MMC breakout card and verify operation.
- Write file server component to retrieve single file from SD/MMC card.
- Combine web server and file server components
- Verify operation for final analysis and presentation.

Milestones :

- Equipment Acquisition and Verification.
- NICHolas Network Interface Driver Completed.
- Web Server Prototype Completed (Static Pages).
- File Server Component Completed.
- Final Web Server Completed.
- Final Testing and Validation using Laptop on Network.

Resources

- EDTP NICHolas network interface -- provided by University.
- SparkFun SD/MMC Breakout Board -- to be purchased by student.
- SD/MMC Flash Memory card -- already owned by student.
- Ethernet Hub -- already owned by student.
- Testing Laptop -- already owned by student.
- Ethernet cables -- already owned by student.

Hardware resource links:

- http://www.sparkfun.com/commerce/product_info.php?products_id=204
- http://www.edtp.com/nicholas_page.htm