UNC CHARLOTTE

An Embedded Wireless Mini-Server with Database Support

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Introduction

- What does this mean?
- Why do we need this?
- Example applications:
  - Restaurants
  - Hospitals

Main Objectives

- Easy to use
- Low cost
- Wired / Wireless support
- Networking and Database Support
- User friendly interface

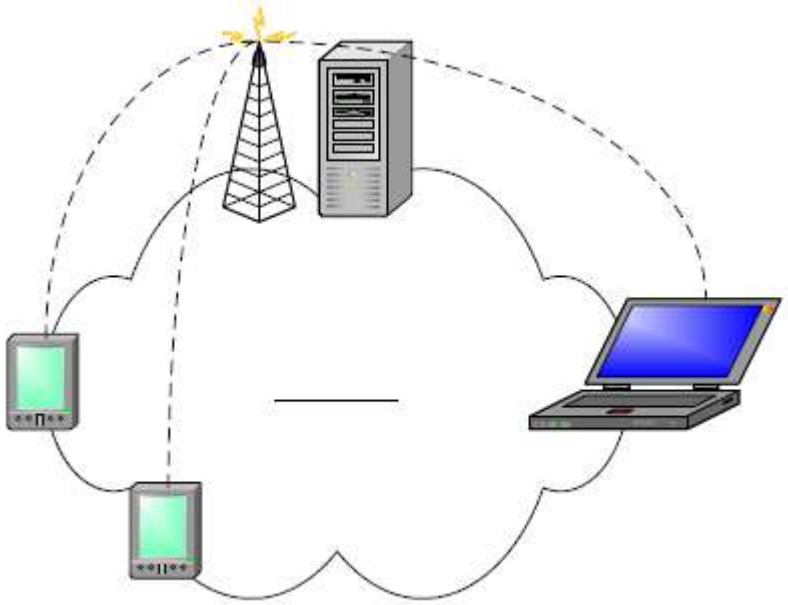
General Architecture

Embedded Hardware platform:

- Mini Firewall Platform FW-6410A , 400 MHz low power processor
  - Four Ethernet connectors
  - RAM
  - Compact flash
  - RS-232
  - Mini PCI & PCI slot
- Wireless network card

Software Architecture:

- Linux operating system, since its source code is available, vendor independence and low cost
- Web-server
- Mini database
- Networking components (DHCP, DNS, Proxy, etc.)



The architecture of the embedded mini-server system [1]

Example Application

Waiter uses portable PDAs to send orders of customers which is stored in server

Chefs in kitchen check orders using web interfaces

Embedded Wireless Mini-server with Database

Customers can access internet and check email via wireless

Countermen can query database to get payment information of each order

Development Environment

1. Host and Target
   - Host: Environment to develop Embedded System
   - Target: Embedded System itself
2. uClibc Toolchain
   - Toolchain: To cross develop applications for the target
   - uClibc: Similar to GNU C library (glibc) with most common func.
3. Developing Applications
   - Download, Extract, Configure, Compile – Host
   - Install and Test – Target

Main System Components

1. Linux Kernel
   - Building and configuring customized kernel modules and installing the kernel image
2. Bootloader
   - First software to be executed when system starts up, responsible for loading the OS, i.e., the Linux kernel that was built
3. Tinylogin
   - Login utilities in single small executable used to invoke different commands
4. C Library
   - Compiling programs by dynamic linking using toolchain

Advantages

- Devices that interact are supported by HTML user interfaces. Hence, no need to install extra customized software
- Low cost and power consumption along with small dimension such that it can fit in a very small space viz., access point hanging on the ceiling

Future Work

- Limitation of read/write times of Compact Flash technology
- Files that are more commonly used can be shifted to hard drive.
- Security mechanisms to authenticate users of different roles such as customers, waiters, managers, etc.

References

[1] **An Embedded Wireless Mini-Server with Database Support** by *Hungchi Chang, Sy-Yen Kuo and Yennun Huang*

Available at: www.research.att.com/~rjana/MobEAII-Paper_2.pdf