VNC Thin-client using Embedded Linux Devices

Project Code: TD7-05

Students:
Mou, Pedro Antonio (03714793)
Sin Wan Lung (03712783)

Supervisor:
Professor Tsang, Danny H K

Sponsor By:
PePlink Limited
Introduction
In our project, we cooperate with PePlink Limited to build a low cost VNC thin client using embedded Linux in Manga Dual Point Blue (DPB) (Figure1.1) for the VNC application. (The VNC protocol is a simple protocol for remote access to graphical user interfaces. It is based on the concept of a remote frame-buffer).

Project Objective
The objective of our project is to lower the total cost of ownership of computers for companies, using the VNC system (Figure1.2). We customized an embedded Linux to be built into the development platform as a thin client to communicate with a server using VNC (Figure1.3) with the following characteristics:
- Low cost hardware with limited storage.
- Limited bandwidth usage.
- Good manageability and high scalability.
- Low power consumption.
VNC Protocol

- This is used for data exchange between the server and clients.
- It also provides basic authentication and security for communications.

Client side
1. embedded Linux on Manga DPB.
2. communicate with server using VNC viewer & display screen updates.
3. low cost & power consumption.
4. no local storage for users.

Server side
1. VNC Server (cross platform).
2. fast network connection.
3. process inputs and send screen updates.
4. powerful to serve different users concurrently.
5. provides storage space for users.
For the VNC client of the system, the storage has less than 128MB, low power consumption (3.4W) and low hardware cost. For the performance improvement, VNC is used with compression and below is the result of performance comparison:

**Performance Comparison (compressed VS uncompressed):**
- CPU time usage
- Memory usage (server only)
- Bandwidth

**Results highlight (Server):**
1. CPU time usage (Figure 3.1)
2. Bandwidth usage (Figure 3.2)
   - Only consumed 1/10 of original bandwidth after using compression & increased CPU time by only 10% to 20%.

**Results highlight (Client):**
1. CPU time usage (Figure 3.3)
2. Bandwidth usage (Figure 3.4)
3. Responsive (w/ compression)
4. Storage space - < 128MB
   - only responsive after compression is used.
   - CPU usage increased by 20% to 30% when compression is used, and reduced bandwidth usage to 1/10 of original.