



Internet Devices for Scientific Applications



Carlos Kavka

Departamento de Informática
Universidad Nacional de San Luis
San Luis, Argentina
email: ckavka@unsl.edu.ar

Overview

- ⑥ A new technology called *embedded internet* can dramatically change the way in which we understand computer applications.
- ⑥ Good news is that scientists from developing countries can get most of its benefits right now.

Internet Devices

To most people, today's Internet is an astonishing technological marvel. But future networked computer systems will achieve a degree of sophistication and functionality that will make today's Internet appear primitive in comparison.

Gaetano Borriello and Roy Want, ACM Communications

Current hardware devices



- ⑥ New hardware devices provides an ethernet connection that can be used to connect them to the Internet.
- ⑥ Since they are connected to the net, they can be accesed with standard protocols.
- ⑥ They can be controlled by standard web browsers.

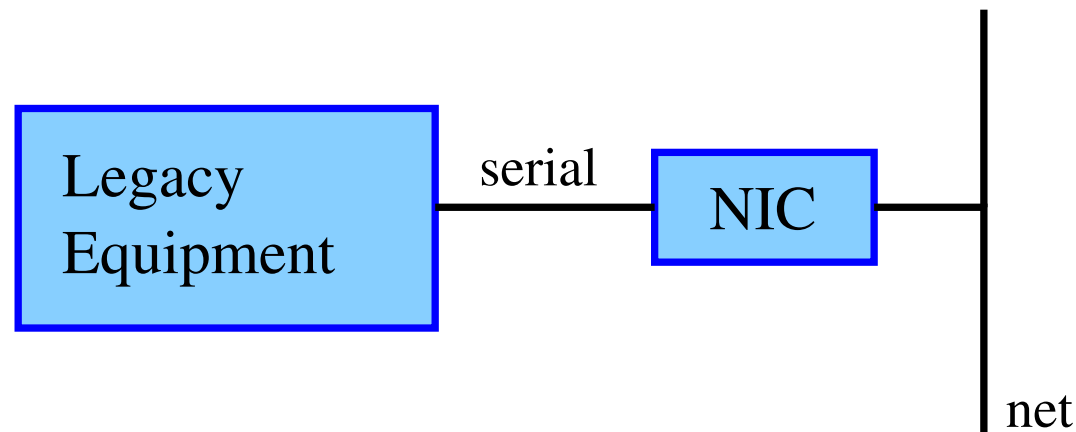
Scientific applications



- ⑥ This new approach provides a real breakthrough in the application of computer technologies for scientific applications.
- ⑥ It is not limited to be used in places with high bandwidth internet connection and latest generation hardware devices.
- ⑥ Most of its advantages can be obtained with just a local area network and no internet connection at all.

Legacy equipment

- ⑥ It is possible to provide a *voice in the net* to old legacy equipment.
- ⑥ This task can be performed with a NIC (Network Interface Computer).





A NIC is a small embedded system that provides

- ⑥ an ethernet connection.
- ⑥ a serial connection (and may be other types).
- ⑥ an embedded web server.

at a fraction of the cost and size of a PC.

The TINI



In the workshop on distributed laboratory systems we are using the TINI as a NIC.

- ⑥ Contains a real time operating system and a Java virtual machine.
- ⑥ Its cost is about 60 US\$.
- ⑥ The software is provided by free.

The TINI

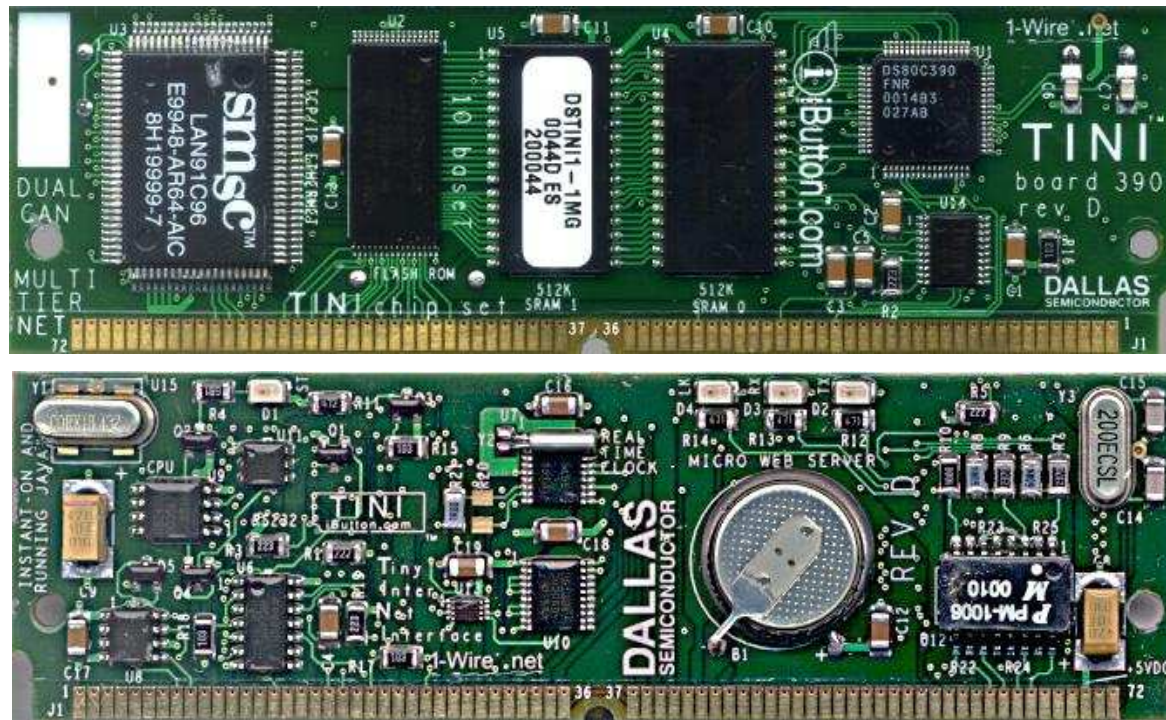


These devices can be accessed through the network with:

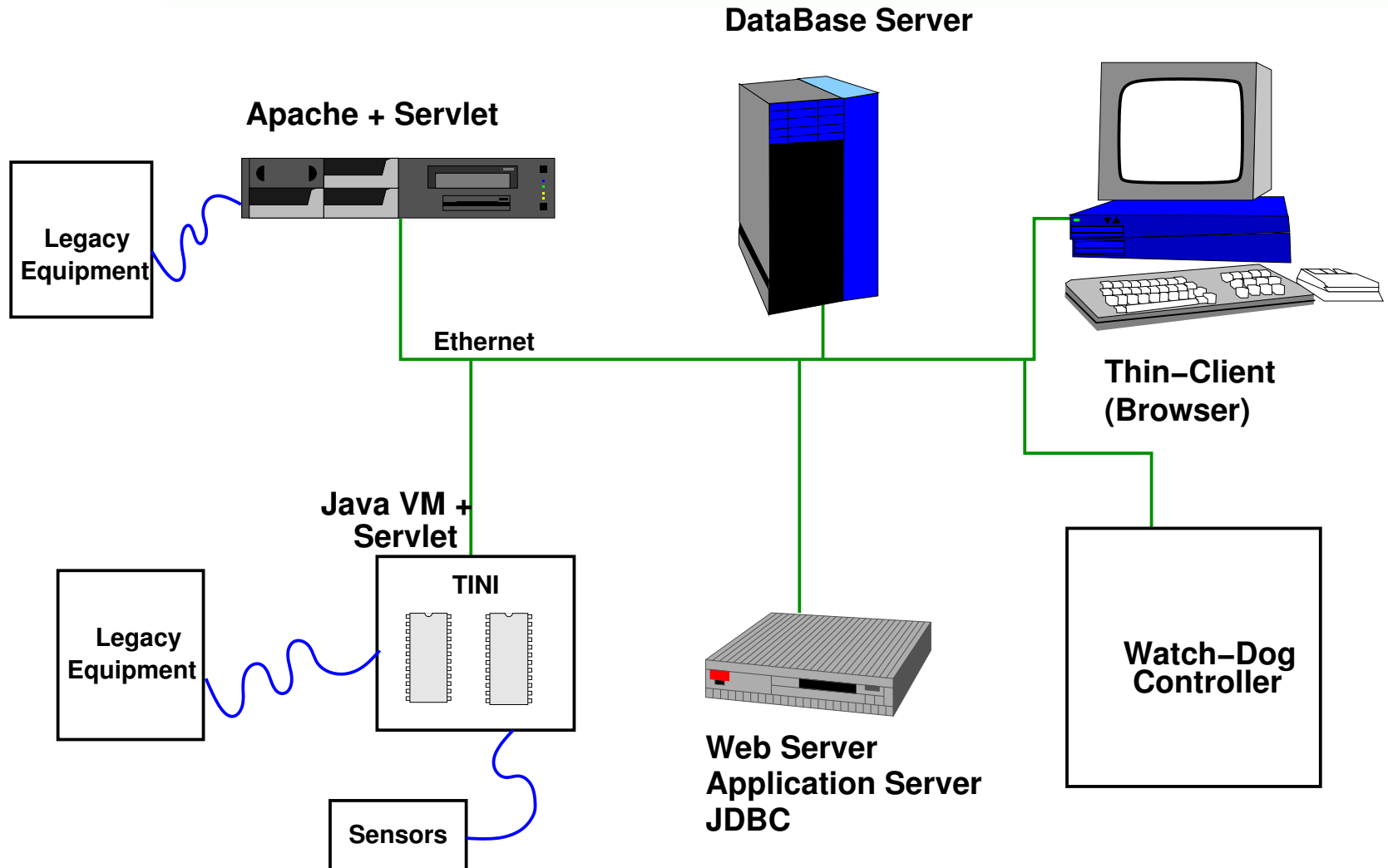
- ⑥ standard programs like telnet or ftp.
- ⑥ from a web browser.
- ⑥ with advanced protocols like RPC or SOAP.

The TINI

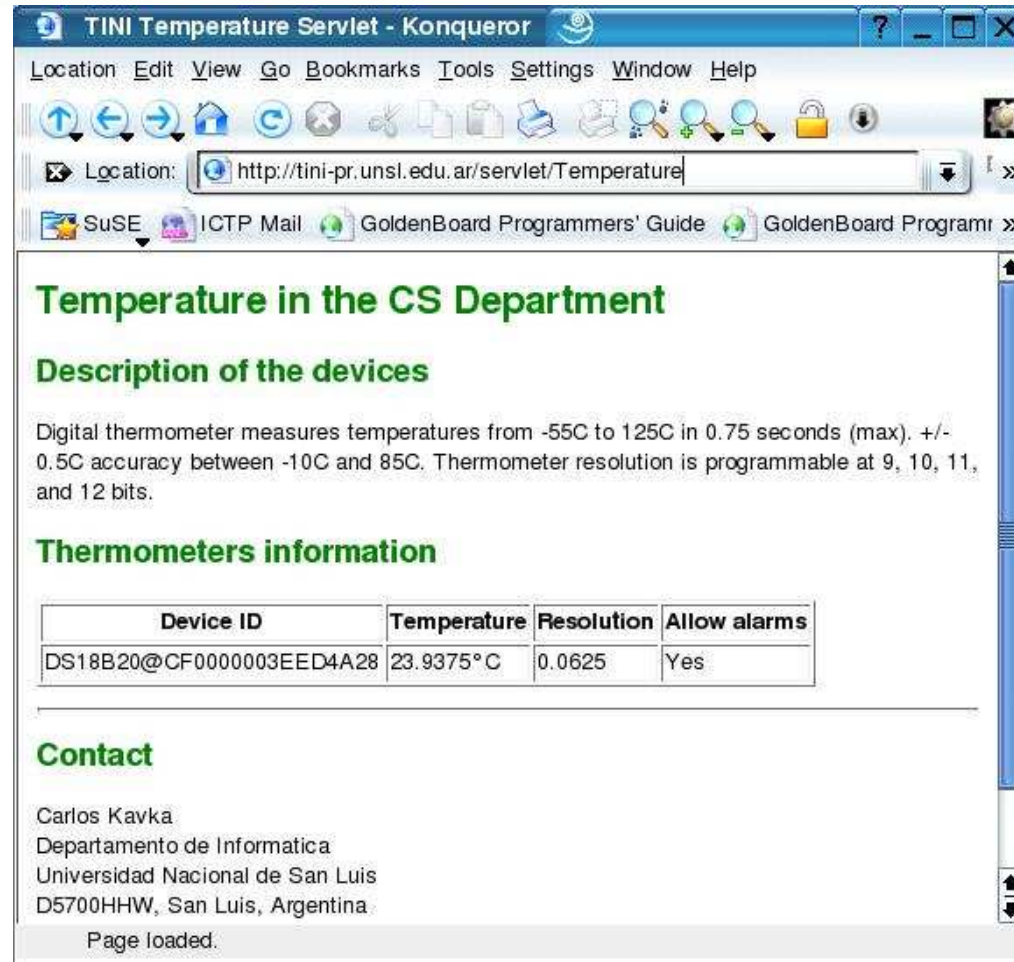
Here it is:



The Distributed Instrumentation



An example



The screenshot shows a web browser window titled "TINI Temperature Servlet - Konqueror". The address bar contains the URL "http://tini-pr.unsl.edu.ar/servlet/Temperature". The page content is as follows:

Temperature in the CS Department

Description of the devices

Digital thermometer measures temperatures from -55C to 125C in 0.75 seconds (max). +/- 0.5C accuracy between -10C and 85C. Thermometer resolution is programmable at 9, 10, 11, and 12 bits.

Thermometers information

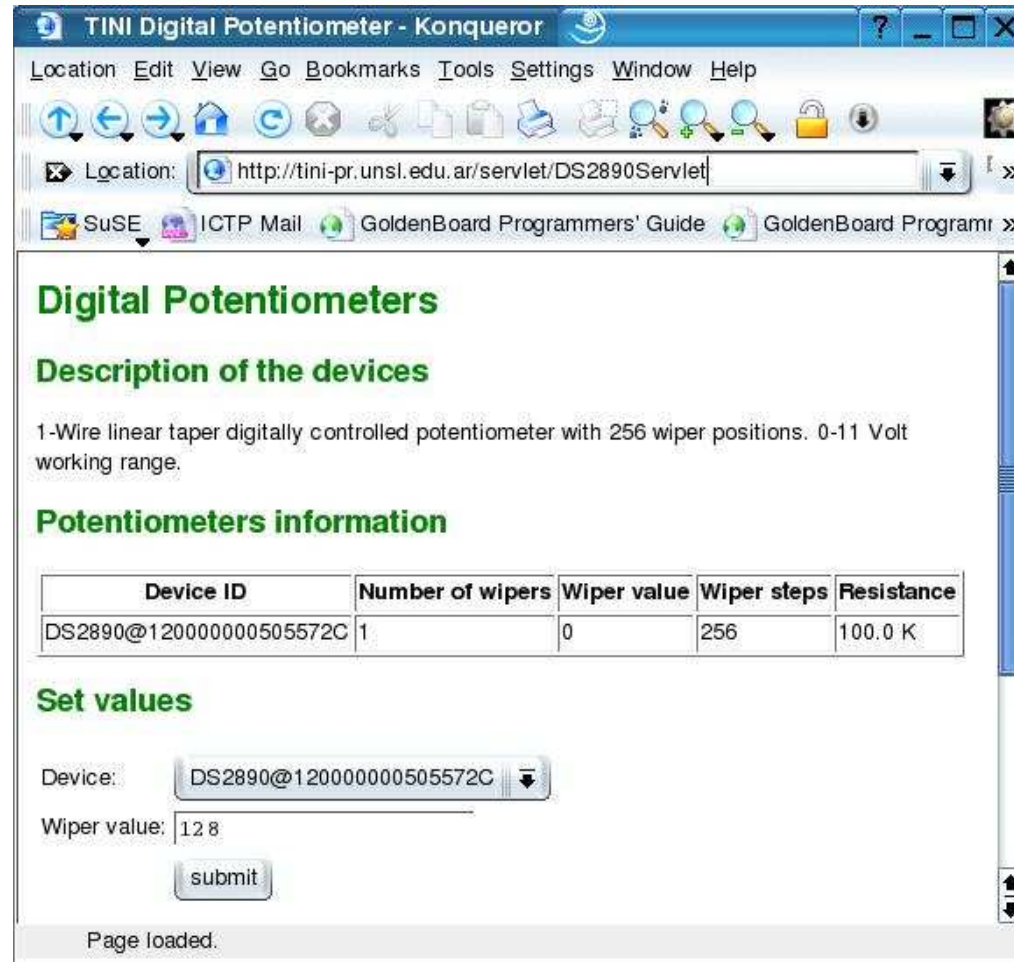
Device ID	Temperature	Resolution	Allow alarms
DS18B20@CF0000003EED4A28	23.9375° C	0.0625	Yes

Contact

Carlos Kavka
Departamento de Informatica
Universidad Nacional de San Luis
D5700HHW, San Luis, Argentina

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Other example



Digital Potentiometers

Description of the devices

1-Wire linear taper digitally controlled potentiometer with 256 wiper positions. 0-11 Volt working range.

Potentiometers information

Device ID	Number of wipers	Wiper value	Wiper steps	Resistance
DS2890@120000000505572C	1	0	256	100.0 K

Set values

Device:

Wiper value:

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Conclusions

- ⑥ The *revolution* of internet devices change the way in which computer applications can be developed.
- ⑥ Most benefits can be obtained just with a local area network.
- ⑥ It provides a *voice in the net* to legacy equipment.
- ⑥ Most of the software tools are open source.