Research & Implementation of uCLinux-based Embedded Browser

By

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Embedded Browser

- Embedded browser is desktop equivalent browser for embedded devices
- Limited browser functionality
- Embedded browser can be used to get information on internet, on intranet, or on private network
- Smart phones, PDAs use embedded browser
Embedded browser for uClinux

- Embedded browsers which run on uClinux are unstable and incomplete

- uClinux stands for “microcontroller linux” and pronounced as “you see linux”

- Original uClinux is a derivative of linux-2.0 intended for microcontrollers without memory management units (MMUs)
uCLinux over Linux

- uCLinux does not have MMU which influences memory management and the multiprocess management

- In standard linux when we call fork() then both child and father processes have different address space

- In uClinux without MMU all processes share same address space
Konqueror /Embedded browser

- Konqueror/embedded is a stable embedded browser for Linux
- Konqueror /embedded supports all browser related standards and protocols, has excellent speed
- The paper proposes to transplant it to uClinux
Konqueror /Embedded browser

- Konqueror/embedded is made up of bottom network connection module, graphical user interface, and KHTML
I/O slave mechanism in the konqueror/embedded

• Opening a website is a asynchronous process
• Konqueror/embedded divides the website into several jobs
• Under the control of main process these jobs work independently using I/O slave mechanism
Improvement of bottom network connection on uClinux

- Threads known as ‘lightweight process’ it can do a job separately as process
- Konqueror/embedded can be transformed to multi-threaded system
- The paper proposes to run konqueror/embedded on single process and turn I/O-slave processes into threads
- In multi-thread all threads share same global data section, it is easier to have data conflicts
- To solve this problem create a public structure array and each structure ties thread ID to it’s data
- When thread exits it deletes the structure from the array
Testing and analysis

- Rewritten konqueror/embedded is tested on uClinux OS and hardware platform used is EM862xL chipset
- The embedded browser runs stably and smoothly
- The official website www.sina.com is used for the tests
- The response time of the rewritten browser is reduced by 2.3% and memory use has been reduced by 6.7%
Conclusion

• The paper develops an uClinux based multi-threaded embedded browser

• It also tells us about how to transplant multi-process system from normal linux to the uClinux system

• It also tells us about how to develop applications on non-MMU system
References

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