

Research & Implementation of uCLinux- based Embedded Browser

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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)
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uClinux over Linux

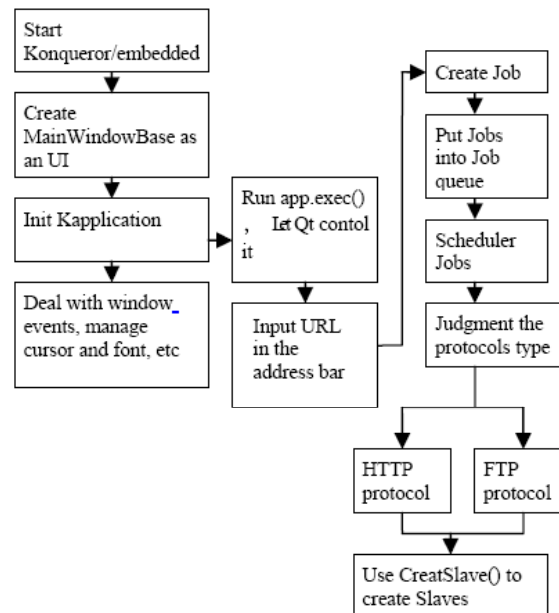
- uClinux does not have MMU which influences memory management and the multiprocess management
 - In standard linux when we call fork() then both child and father processes have different address space
 - In uClinux without MMU all processes share same address space
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Konqueror /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
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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

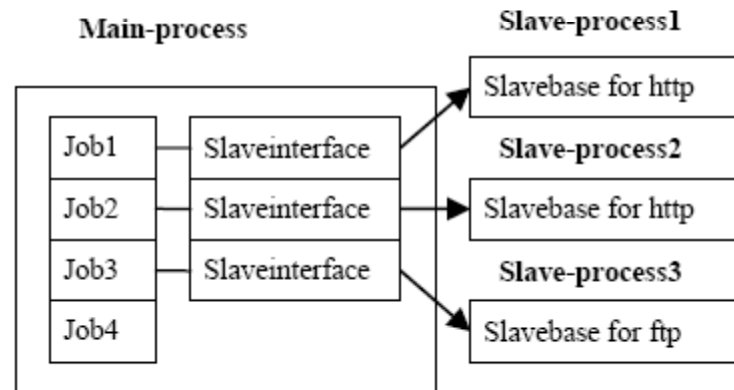


Figure 2. Jobs and Slaves in I/O-Slaves

- 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 mutli-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
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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%
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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
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References

- **Research & Implementation of uCLinux-based Embedded Browser by** WANG Minting, LIU Fagui
School of Computer Science and Engineering, South China University of Technology, Guangzhou
 - [Konqueror - Konqueror Embedded](#)
 - [Konqueror Embedded - Wikipedia, the free encyclopedia](#)
 - [uCLinux™ -- Embedded Linux Microcontroller Project -- Home Page](#)
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