lightweight bootchart

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Motivation

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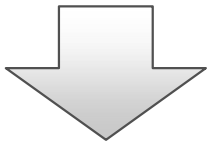
- bootchart (http://www.bootchart.org)
  - is a tool for visualization of the GNU/Linux boot process.
  - corrects process information, etc with shell scripts (bootchartd).
  - **Issues**
    - The overhead of data correction makes difference from what the boot process should be.
    - especially in the case of poor CPU.



Needs of lightweight version!!

Case study (PXA27X)

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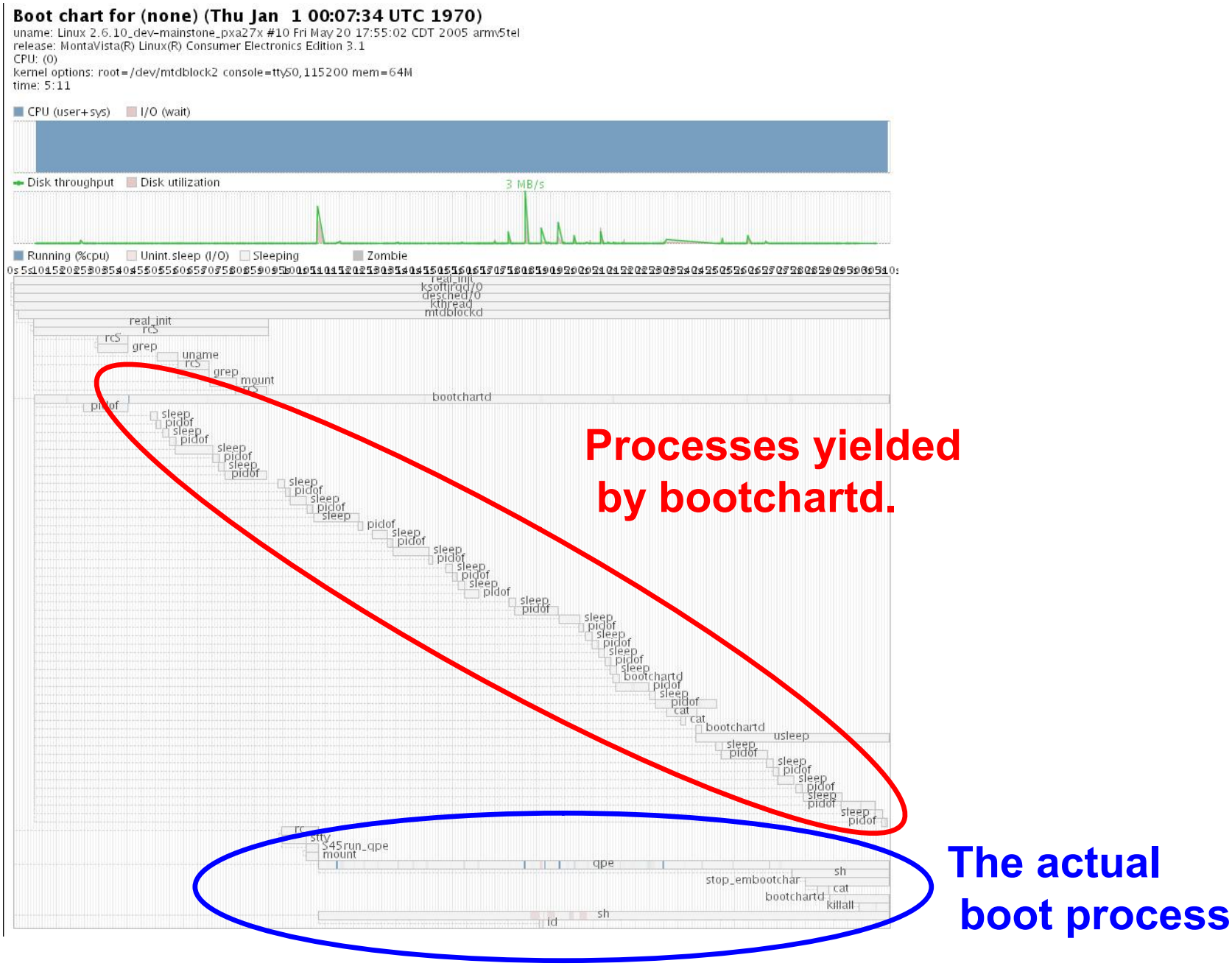

From “Visualizing Resource Usage During Initialization of Embedded Systems” by Matthew Klahn (Motorola, Inc.)

Similar activity

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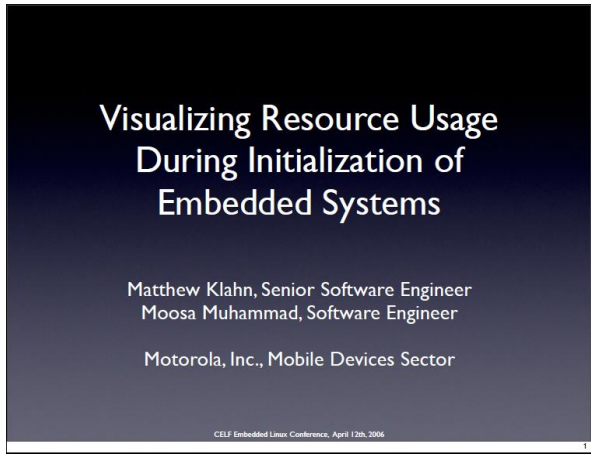
- embootchart
  - lightweight version of bootchart for embedded space.
  - written in C++.
  - **Status**
    - neither source nor binary availabe.
  - **History**
    - Matthew Klahn from Motorola made a presentation at CELF ELC 2006.
      - http://tree.celinuxforum.org/CelfPubWiki/ELC2006Presentations?action=AttachFile&do=get&target=VisualizingResUsageDuringBoot.pdf
      - “Will publicize on CELF mailing list. This should happen fairly quickly (weeks, not months)”...
    - It became a topic in Celinux-dev ML, but there was no progress.
    - tried to contact him, but got no response...



Let’s build from scratch!!

Why bootchartd sucks

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- written in a shell script.
- A lot of processes are executed and exited.
  - executes cat command periodically to output data to log files.
    - cat /proc/*/stat >> proc_ps.log
  - executes pidof command periodically to determine whether the specific process is created or not.
    - bootchartd will be terminated when mingetty or getty is created.

Strategies (1)

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- implement in C.
  - writing and optimizing string operations in C will achieve better performance because data formats are semi-fixed.
- use SIGUSR1 for stopping bootchartd.
  - reduce the big overhead of watching the creation of specific process.

Strategies (2)

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- reduce system call overhead such as open/close, ...
  - writing data to log files.
    - open once, write many times.
  - reading "/proc/PID/stat" files.
  - use inotify system call to detect the creation and deletion of PID/ directories for avoiding directory search each time.
    - open /proc/PID/stat at the creation time,
    - lseek and read repeatedly until the process exits.

Strategies (3)

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- store data to files in tmpfs.
  - Reduce overhead of real I/O devices such as HDD and flash.
- keep compatibility of data formats.
  - no need to prepare another parser and renderer.
- no need to modify kernel.
  - The same usability as the bootchart.

What's next?

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- Publication
  - CELF internal? (Mailing Lists? Wiki? Any good SCM?)
  - as a Sourceforge project?
  - incorporating into the bootchart project?
- Need help!
  - co-development, evaluation, etc.

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THE POSSIBILITIES ARE INFINITE