# Bandwidth allocation in RT Linux

**Vladimir Pajkovski**

**Abstract**

In systems intended for handling continuous media (both video and audio), standard Linux does not provide suitable scheduling of the system resources regarding the complexity of the tasks. Where such a system consist of mixed applications, conventional computing is executed at the same time with hard real−time tasks, single scheduling policy is not able to satisfy the demands of the real−time application. If proportional resource allocation is applied, each task can recive a fair share of a resource. Different sheduling policies are appropriate for diffent applications. In that matter, few Fair−sheduling algorithms are tried out. Fair−sheduling algorithms make sure that each resource gets proportional share of the CPU while executing the task. For implementing the algorithms and testing behaviour of the application, RT Linux is used.

## Introduction

Fair−Scheduling algorithms guarantee allocating bandwidth fairly. Allocating the bandwidth in a fair manner automaticlly ensures that ill−behaved sources can get no more than their fair share[1]. Start−Time Fair Queuing (SFQ) is a resource allocation algorithm that can be used  for acheaving fair CPU allocation[2]. It achieves fair allocation of the CPU regardless of variation in available processing bandwidth, therefore meeting the key requirements for of a scheduling algorithm

We implemented Start−Time Fair Queuing for testing the behaviour of video aplications in RT Linux. Reason for choosing RT Linux is because of the inability of standard Linux for roviding suitable scheduling of the system resources.

## Design of the sheduler

The scheduler can be designed in principle in two ways. It can either an existing data structure be used, where new sheduling policies can be set within the sheduler framework(like RT Linux)[], or another way is to introduce a new data structure, where a sheduling hierarchy can be proposed (Qlinux, for example)[3].

We decided to use the existing RT Linux modular structure. In this way, without needing to modify the structure, it is possible to try out (time permiting) several Fair−Share algorithms. However, we only have changed the scheduling policy.

......more about the scheduling policies, events about scheduler activation ...

## Implementation of the scheduler

....little bit later....

......together with the changes in `rtl_schedule()`....

## Where it is used

XawTV was the video and audio application used for straming and recoding/playback. Capturing images has also been performed. Starting the application takes some more time than in standard Linux, while changing beetween TV chanels is much slower in RT Linux. However, preemption of the task running was not possible. Starting other
applictions (like Netscape) took much longer time than under standard Linux.

.....some measuring results to be shown......

## Testing and Results

For testing we have used the RTMM (DTU−Real−Time Multi Media) tool.
Several measurements of real−time scheduling of multiple streams
(video, audio, images...) were preformed. Testing of the behaviour
of the aplication used is presented.

.....more to come.....very soon.......

## Conclusion and Future Work

A modular scheduler was implemented in the RT Linux code.
Decision on implementing a Fair−Scheduling policies

Further developments may include implementation of some more scheduling
algorithms, like EEVDF(Earliest Eligible Virtual Deadline First) and
HP Fair−Sheduiling.

## Acknowledgments

I would like to thank my supervisor for giudance and support in the work
on my thesis. My gratitude goes to the people that previosely succeeded in implementing
a modular schedular in RT Linux and making it available for further developement.

## References

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Analysis and Simulation of a Fair Queuing Algorithm

[2] Albert G. Greenberg and Neal Madras, 1992

How Fair is Fair Queuing?

[3] Pawan Goyal and Xingang Guo and Harrick M. Vin, 1996

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