

VE482 — Introduction to Operating Systems

Project 3

Manuel — UM-JI (Fall 2018)

Goals of the project

- Kernel space implementation
- Scheduling algorithms
- Kernel parameters

1 Introduction

Two days... Already two days that you have submitted your work on the LemonDB system and still nothing, not even a word or an email. On this cold morning of November you slowly walk to your work under the light rain, lost in your thoughts. Why? Why is this Mr. Frown so mean? Your teammates had some very nice feedbacks, one of them has even been promoted. But on your side, nothing! As you feel overwhelmed by frustration, you mentally devise some strategies to approach Mr. Frown. You picture yourself confronting him and showing him how valuable you are to Lemonion Inc.. You anticipate every sentence he could pronounce and prepare a striking response.

Without even realising it you have arrived to your cubicle. Stimulated by this long introspection you decide to step into Mr. Frown's office. Arrived at his door you lift your hand and are ready to knock when you indistinctively hear Mr. Frown pronouncing your name! You slowly stop your movement and notice an upset tone in his voice. Pretending you need to lace your shoes you bow down and keep listening, while looking around to ensure nobody notices you.

After a few seconds it becomes clear that Mr. Frown is very upset with you. Not with your work, just with you. Although his words are sometimes unclear it is evident that he is furious that you worked well. He is saying that you are arrogant and want his position! Astonished by the absurdity of the situation and Mr. Frown's preposterous non-sense, you stand up and walk back to your desk. You slowly seat down and switch your computer on while trying to regain your composure. As the computer has completed the booting sequence you notice a new email from your friend Bob.

Date: Tue. 20 Nov. 2017 09:34:24 +0800

From: bob@coolzone.it

To: n00b@lemonion.com

Subject: what's up?

Hi buddy,

Hope you're all good. What has Frown said about your work?

Here the company is so great, we had a giant party yesterday night so we almost all slept here! Jim, our boss (and friend) just announced he wants to test something new and there might be some openings. Would be great to work together, same as in college.

Jim is here today, feel free to pop in and have a chat, maybe you could join the new dev team...

See you buddy!

Bob

Bob, Software Engineer at CoolZone IT solutions.

Knowing your time is counted at Lemonion Inc. you have nothing to loose, so you grab your bag and leave, hoping to catch this perfect boss, and never to return here.

As you enter in the building of CoolZone IT solutions, you are struck by the atmosphere: you see several groups of relaxed, laid back people. A bear feet man wearing a flowery swimming-suit passes in front of you, and starts talking with a girl at the front desk. After she has given him a large bag of golf clubs he leaves the building. You now walk to the desk and inquire about the CEO. At first it seems she cannot understand you, but all of a sudden she exclaims "You mean Jim? He is on the slide! He'll be down soon..." Feeling confused by her answer you gaze at her until she directs your attention to your right. Following her sign you walk a few steps and discover a giant slide coming down from the fifth floor and ending up in a giant ball pit where you recognise your friend Bob. He seems to be playing (discussing?) with a woman with long hair. However as they exit the pit you notice that the woman also has a long beard, meaning she is probably not a woman...

Feeling awkward and not knowing what to do, you choose not to move and wait for Bod and the other person to walk to you. As they are approaching he introduces Jim, his boss. Jim starts the conversation saying "Hey man, how are you keeping?" Before you can answer he carries on "Heard you were working with this – censored – Frown. We were together in college, he was a real – censored –." At least you have some common ground with Jim: you both hate Mr. Frown.

Jim speaks a lot, really a lot. Nothing seems to stop him. Although everything sounds confused in your mind you recollect that he offers you to work on a new project, but nothing is ready yet. So his conclusion is that someone needs to work on it, why not you? From what you understand he vaguely remembers that during his undergraduates studies he heard that lottery scheduling could almost be used for real time systems. He would like to use part of his new funding to test it and see if he could launch a new smartphone with a new Operating System based on Minix 3.

His idea would be to take Minix 3 kernel, implement lottery scheduling in it, do the same with Earliest Deadline First (EDF), and compare their performance. He concludes the conversation with those few words: "You can start now, go in the ROMS, grab a laptop, and code. Organise yourself as you want, take as much holidays, free time, breaks as you want. Only requirement is that the project is completed by the end of the first week of December. Cheers man!" On those words he runs to the pit, performs a somersault, and disappears among the balls.

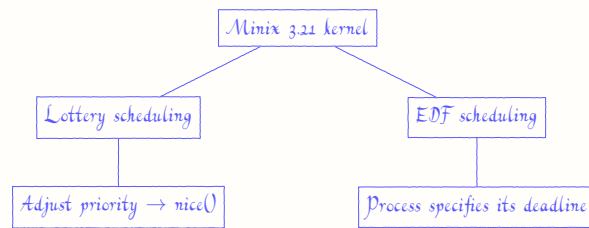
Bob smiles and says "Welcome to CoolZone IT solutions! Follow me to the ROMS, our Rest, Organize, Manage, Space." On your way to the ROMS Bob gives you a few more details regarding the project. As this is much information you cannot fully understand everything and put on a strange face. Bob looks at you, and says "OK buddy. That's a lot to take, but don't worry, here there is no Frown, so relax and enjoy." While speaking he grabs a [notebook](#) on the massive table at the center of the ROMS, hands it to you, and continues "Those are my notes, everything you need to know to work on the project. Hope you remember how to read my terrible handwriting..." His last words are punctuated by his loud laugh, but he suddenly stops and give a circular look at the room. Then he moves back toward the door, grabs another notebook, and triumphally announces "Here, it is! The [company's directory](#). It seems Sylvia has already added you! So you can start working and catch your teammates as soon as you see them, some are not coming often so don't hesitate to ask around." On those words Bod greets you and leaves the room.

As you have not idea what to do and where to start you seat at the table, and face the door hoping someone will comes...In the meantime you grab a laptop, boot it up, and click on the icon labeled *Minix 3.21*. A

virtual machine starts and here you are, ready to work in a new company! Good luck for this new adventure...

2 Bob's notebook

* Tasks.



1/ Use kernel arg to switch between 3 algo (EDF, lottery, default)

2/ Write test prog to demo Jim

* Requirements.

1/ Generate patch with changes and submit on Canvas

2/ Demo to Jim and explain the whole work

3/ Changes must be done at kernel level (not only userspace)

* Difficulty.

Task	Level
Lottery scheduling	25
nice() system call	15
EDF + possible to specify deadline	40
Switch between 3 algo	30
Test prog for lottery and EDF	20+20

* Milestones.

1/ Nov 29 / Dec 1: lottery scheduling with nice

2/ Dec 6 / Dec 9: EDF scheduling with deadline spec

3/ Dec 13: all completed!

3 CoolZone IT solutions company directory

Teams

Zhang Yichi & Zhao Wenhui + Zhou Runqing & Zhu Yuankun

Feng Junhao & Zhang Ruitao + Jiang Zijian & Shen Tianhong

Xu Jiahong & Yao Sihan + Lin Yiqiao & Zhu Yicheng

Liu Boning & Zhang Jiaruo + Wang Ren & Wu Wentao

Deng Junwei & Meng Wenhao + Ge Tianyi & Ye Chenhao

Chen Jiayi & Shen Zihao + Carlos Bertelli & Chen Yichen

Cui Yinan & Wang Xining + Wu Yifan & Zhang Xun

Hu Chong & Tang Qianrong + Zhang Ting & Zhou Chenxin

Shi Jiecheng & Luo Changxu + Fu Xiaohan & Tang Wenda

Chen Cheng & Xu Su + Shen Chunhao & Zhao Tianyi

Cao Jing & Ma Jing + Yang Jinde & Zhu Jiaxu

Ceng Jinhao & Yang Xiaoyu + Dong Jing & Geng Zichen

Ma Zhixian & Ye Weijie + Zhao Yuxin & Zhu Junru

Lin Chenru & Zhou Shijie + Zhang Yiyang & Huang Weiji

Zheng Xiaolei & Zhou Yanjun + Dylan Carleton & Nicholas Paris

Wu Guangzheng & Zhang Ruiwei + Ren Qihang & Sheng Beiji

Jin Minhao & Wang Tianyu + Gong Jie & Sun Shangquan