

Problems regarding teaching Linux programming for Industrial realtime programmers

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Abstract

Paper describes problems regarding teaching of Linux programming of our students. First and only course of this based on parallel system programming at level of utilities. This way was chosen because anti-viruses are utilities and there were all of technological TOP3 antivirus software houses in 2007 based in Czech republic and Slovak republic, which were established by divorcing Czechoslovakia (Czech and Slovak federal republic) in 1993. First of them is based in Brno that is 130 km from Bratislava and second of them is based directly in Bratislava. Level of teaching and other discussed factors caused that Linux programming does not take sufficient results and does not support Linux knowledge of students as well.

1 Introduction

We and our PhD candidates use RTAI kernel modules to control Plasma based Cutting machine for metallic materials. JAVA/JNI based Eclipse application is used for an GUI. Therefore we planned to educate bachelor grade students for such type of programming. Before our course students have studied only Microsoft Visual Studio based C programming with basics of Algorithm design with basics of computer architecture. First of all we teach them JAVA with command line interface at the beginning and then GUI.

The first part is as bad for students as they are not able to repeat compile command or edit source code without JBuilder IDE. The second part is much more popular. Because of need for Web API of controlled processes in the industry as last part they rewrite JAVA application to JAVA applet. Last part is not popular. Second course is based on Linux programming. First thing that was eliminated was extremely unpopular need to program only in text ter-

minals/console without X server. It is same problems as in JAVA. students are not able to use command line interface. Why are students so afraid of command line(shell) and Linux as well?

2 Pre-university Education

Many students that studies and universities of Technology are not best student but worst ones. It is because on lower grade education are information technologies presented as main knowledge of anyone. They never heard about computer programming

This is because they never seen command line interface of computers. Although There was study developed between 2004 and 2005 which listed extreme savings per seat when open source e.g. Linux solutions will be used as shown by figure 1. Because Slovakia is member Eurozone(officially the euro area) from January the 1st, 2009, we can use conversion exchange rate 30,1260 SKK per 1 Euro. Then saving per 2500 seats is 5,127,630.62 EUR per inno-

vation cycle of 6-8 years. This amount of money equals to 0,9532 EUR per inhabitant per innovation cycle. There are 225,766 university students in Slovakia what is 90.3064 times more than number in study. Then there will be 86,08 savings per inhabitant per 8 years for only University students using open source solution.

Listed study shows that when there will be 50% migration to Open Source in non-priority areas like commercial sector and 100% migration at primary and secondary schools there will be savings at that time prices at least 18 billions SKK (597,490,540EUR) during 6-8 years. Educational sector can save 5.01 billion SKK (166,301,534 EUR) including saving in primary and secondary Education 4.1 billion SKK (136,095,067 EUR) and universities to save 0.75 billion SKK (24,895,439.20 EUR). This equals 12,150 computer seats when compared to study.

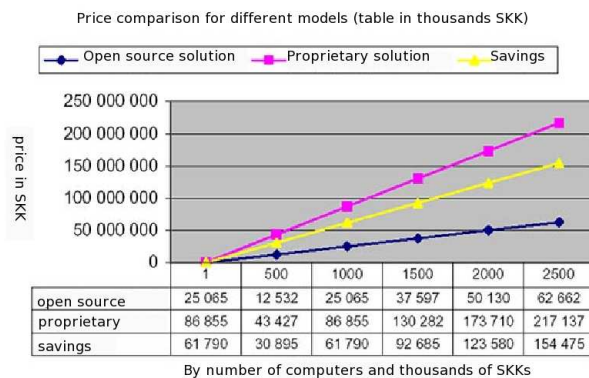


FIGURE 1: *Savings with use of open source solution[1]*

Therefor State secretary for Education join program to educate Primary and secondary schools teachers how to teach basic operation in open source software as shown of Figure 2. There were much anticipation of such project for us to prepare students to code for Linux , because it may stop FUD form Microsoft to act as main barrier from usage of Linux. This may cause not to aware use command line because student will know that there is also GUI for Linux. This act says that schools form Germany , Poland, Portugal, Spain and Slovakia will use open source software especially Openoffice.org and Mathexer with support of European Union's Comenius program But..



FIGURE 2: *Linux tag announcement[2]*

But This project in Slovakia failed. One and half of the month after this project started there were elections at Slovakia. And it completely changed situation. Project was stopped.

3 Political influence

Political representation as been changed and State secretary form 9,5% Hungarian minority was changed by Slovak nationalist. Therefor everything have to be reversed. And there was not exception in pro-OpenSource orientation. official reason to cancel tender for this project realization was "incorrect set of tender criterions to chose best offer... which too much preferred teacher's education instead of price"[3]. Education of teachers is most important not to stay at Microsoft's dominance. Our generation of 70's was leaded at computer courses by programmers. Current students are supervised by pedagogues which do not program computer codes. Pedagogues attend 3 week course of computing sponsored by Microsoft are know only its Windows and Office form faculty and lower education grades. The worse thing is that in december 2006 was tender repeated not publicly but with 5 chosen companies[4]. And the worst thing is that winner[5] is company that is present in current (august 2009) clientelistic

cause of Education state secretary[6]. It is little bit funny that author of Microsoft Office is Charles Simonyi(Simonyi Karolyi) which is hungarian.

4 Principle of university education

There are also problems in principle of university education. Especially in capability of university lectures to check-up students during study. There is and tradition for finished students to write their nicknames on the street near campus with same diagram or message. This year there was written sum block with several inputs. one of the inputs is described as "horse" meaning cheat sheet. In the programming there is not possible to use cheat sheet and therefor 40% of the students recognized Unix programing as a worst course of the semester.

Question is why student are able to use "horse" on each course except programming?

1st grade of primary school	53,000
9th (final) grade of primary school	65,000
1st grade of secondary school(offered seats)	93,000
4th (final)grade of secondary school	64,000
1st grade of Bachelor level (offered seats)	69,000

TABLE 1: *Count of students and offered student seats for next academic year in grades as of 2006[7][8][9]*

Table 1. answers this question for slovakia especially when we add information that university and secondary school endowments depends only on count of its students since 2002. In addition Technology is not preferred subject of study for vast majority of students. They hate mathematics and physics at most. Therefor study of technology is near exclusively for students thats application for study of humanities was rejected by university capacity. Only for about 1/12 of students of technology was technology their first choice of university study. And about half of them is unable to learn computer programming as found by Dehnadi[10]. As a result only 1/24 of students is capable to learn to produce computer programs. When we have 72-75 student seats in same grade(we are capable to teach 150) there are 3-5 students capable to learn to code in one grade. As Intel found there is only 1/100 of programmers who are capable to do parallel programming[11]. Therefor only one student in 20-30 years is allowed to be successful in course I deal with as only Linux programming course.

4.1 Unix/Linux

As additional problem there is fact that in 1995 then was only Internet access for students at our university via Digital Ultrix machine with vdt52s terminals or emulated vt100. We were needed to teach Unix shell commands to access internet before studying Unix programming. After years there was made a change: students can access Internet by their own laptops or Windows machines. We also have DOS and 8-bit personal computer usage experience and therefor we had no awareness of command line. Our course strategy was made long before we had been studied it. Generation before us was another then current generation. Technology was only studied by top students with interest in computer programming. Course strategy is based on assumption that nothing changed from that time. As described before assumption is false.

4.2 Time to study

Another reason of problems is miss-prediction of time to study. In 1995 then there were two courses with 6 credits. Number of credits per course is at our university counted as sum of 50 minutes lectures , 50 minutes applied practical laboratory lessons and 60 minutes preparation at home per week. Then there were 2 hours of lectures, 3 hours of lessons and predicted 1 one hour at home. when semester has 12 teaching weeks students have been studied two time 72 hours which equals 144 hours of Unix study. Now students have only one course with 5 credits (2 hours of lectures, 2 hours of lessons and 1 hour at home). Then they have 60 hours of Unix study at most. But as seen in introduction industry needs equal range of knowledge of graduates.

4.3 Old school methods

In addition lecturers are from different ages (over 55 or under 35) and there is hard to find and consensus in education methods or policy (friendship or authoritative) of access to students. In the methods we can agree across ages, but not in policy. Older generation prefer authoritative policy and younger prefer to used mixed authoritative and friendly policy.

4.4 Technology

As university have endowment only 1,300 EUR/year/student and students have 11 courses per year or 60 credits/year therefor we can use only

108,4 EUR/student/year which is extremely low to get Massive parallel processing based supercomputer (for at least about 1 million USD) or specialized parallel computing lab (for about 10 millions UDR to build a 2 millions USD per year of usage) needed to effective teaching of parallel programming.

5 Conclusions

We described problems in teaching Linux programming at Slovakia. As result we would only resign to such type of education which is unacceptable for slovak software industry or make course based on new assumptions which are true. Teaching kernel mode programming must stay to be part of thesis consultations as it is done just now because there is no time to teach it at normal courses and thesis about it is chosen normally only by students who are interested in the problem of hard realtime programming at work. As shown some problems are solvable some are not especially financial problem and popularity of study of technology. In area that we can solve we must do it because of industry but it will be helpful for us to get financial support from listed Bratislava's antivirus labs ESET (with NOD-32 product) a Brno's AVG technologies (Grisoft in the past, Brno is 130 km from Bratislava) and Prague's Allwill Software (with AVAST product, Prague is 331 km from Bratislava) [12] to solve another problems. But it will be harder because on June, the 11st 2009 signed state secretary new three year agreement with Microsoft for 13,127 Windows and Office university Campus licenses for year cost of 1,001,983.91 EUR. old agreement finished on June the 30th 2009.

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