RONOG 7 (Bucharest 29 september 2022)

Title: Unix influence over Internet startup and subsequent large scale Internet development (a personal experience)

Presented by Alexandru Rotaru

- CEO of RoLink Plus SA
- board member & founder of ANISP on behalf of RoLink Plus SA
- board member ISOC Romania
- founder of GURU - Romanian Unix User Group in 1992
- initiator of ROSE conferences (1993-1996) ROSE – Romanian Open Systems Event
- member in EurOpen GB on behalf of Romania (1993-1996)

Unix influence over Internet startup and subsequent large scale Internet development (a personal experience)
Period: 1981-1989 Location: Outside Romania

1981 – CSNET (Computer Science Network) linking universities computing centers to the Internet and to the US supercomputing centers funded by NSF

1983 – 4.2 BSD – TCP/IP Berkley Sockets project financed by NSF
- students switched from RSX11M & RT11 to Unix in computer centers of some known Universities: (Evi Nemeth – Boulder University, Computer Science Dept)

1985 - NSFNET (research & education Internet Backbone) (NO commercial ISP) 56Kbps leased-line links w. PDP-11/73 minicomputer RSX routers in 1986- 1987 7 locations --> +13 more locationa 1.5 Mbps in 1988 based on IBM BSD routers)

1985 – 4 Oct 1985 RMS (Richard Stallman) starts Free Software Foundation declaring GNU General Public License (GPL), copyleft (as opposite to copyright), free software movement and The GNU Project (GNU is not Unix) based on GNU Hurd Kernel. GNU Hurd was almost “never” functional.

1987 - MINIX 1.0 – Andrew Tanenbaum a 3.5” diskette in “Operating systems – design and implementation (12000 source C lines) (Intel 8088 – Intel 80386). Copyright issues with AT&T System V source code at Vrije Universitat Amsterdam C.S Dept

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- Romanian computers:
  - computers FELIX C-256 series running French IRIS-50 operating system
  - minicomputers: INDEPENDENT & CORAL (PDP11 family) running RSX11M & RT11 operating systems running on MD-40 (40Mb) disks.
  - microcomputers: FELIX MC-8 (I8008), M-18, M-118 (I8080) & M-216(I8086) running: ISISII, SFDX, CP/M or MP/M operating systems on 8" floppy disks
  - IBM-PC compatible (1983-84): Felix PC, Junior XT (PC-DOS./MS-DOS)

– NO Ethernet Interface available until 1990 (COCOM restrictions)
Note: 3COM - 1st Ethernet Interface commercially available in Romania: 350 USD guaranteed for 70 years

- Romanian networking: is reduced to: modem links (leased lines or dial-up) with low rate (2400bps – 19200bps usually) & NO Ethernet interface.

- Romanian networking applications:
  - remote service (IIRUC Bucharest) 9.6Kbps - 19.2Kbps
  - data transfer between regional computing centers: RENAC/RENOD project at ICI 1983/1984 (3 nodes: Bucuresti, Bacau and Cluj) 48Kbps
  - -1979 – proiect retea LAN Romania CAMELEON (ICI)

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Beginnings of Unix in Romania

- 1982-1983: AT&T Unix System V6-7 Tape for PDP11 (ITC Timisoara, ITC Cluj & ICI Bucharest)

- ITC Timisoara & Cluj porting software tools for Unix System V on Romanian manufactured computers (PDP11), 1984-1985

- ITC Cluj manuals translated in Romanian language from PDP11 tape

- ITC Bucuresti, “the U System Project” (a Romanian Unix System developped in 1984.The project rebranded PC Unix mooved in 1986 to 8086 computer (M216) without MMU and later on PC-based platforms (based on BIOS functions)

- IIRUC + Felix - Unix System V6 on Coral 4030 for a Logic Simulator for digital boards

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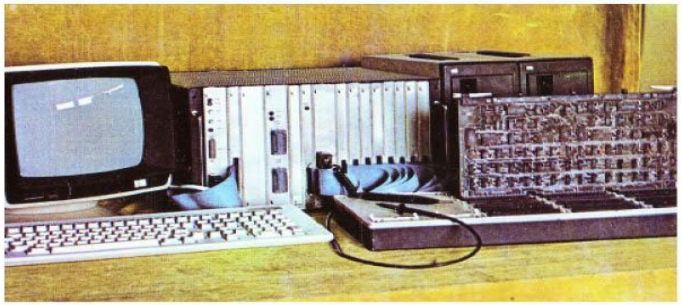

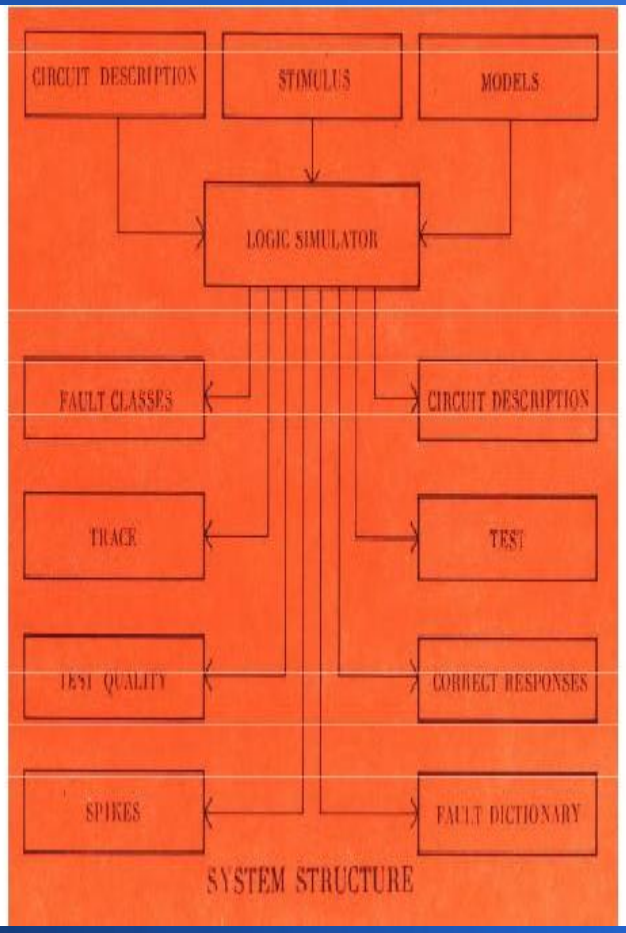

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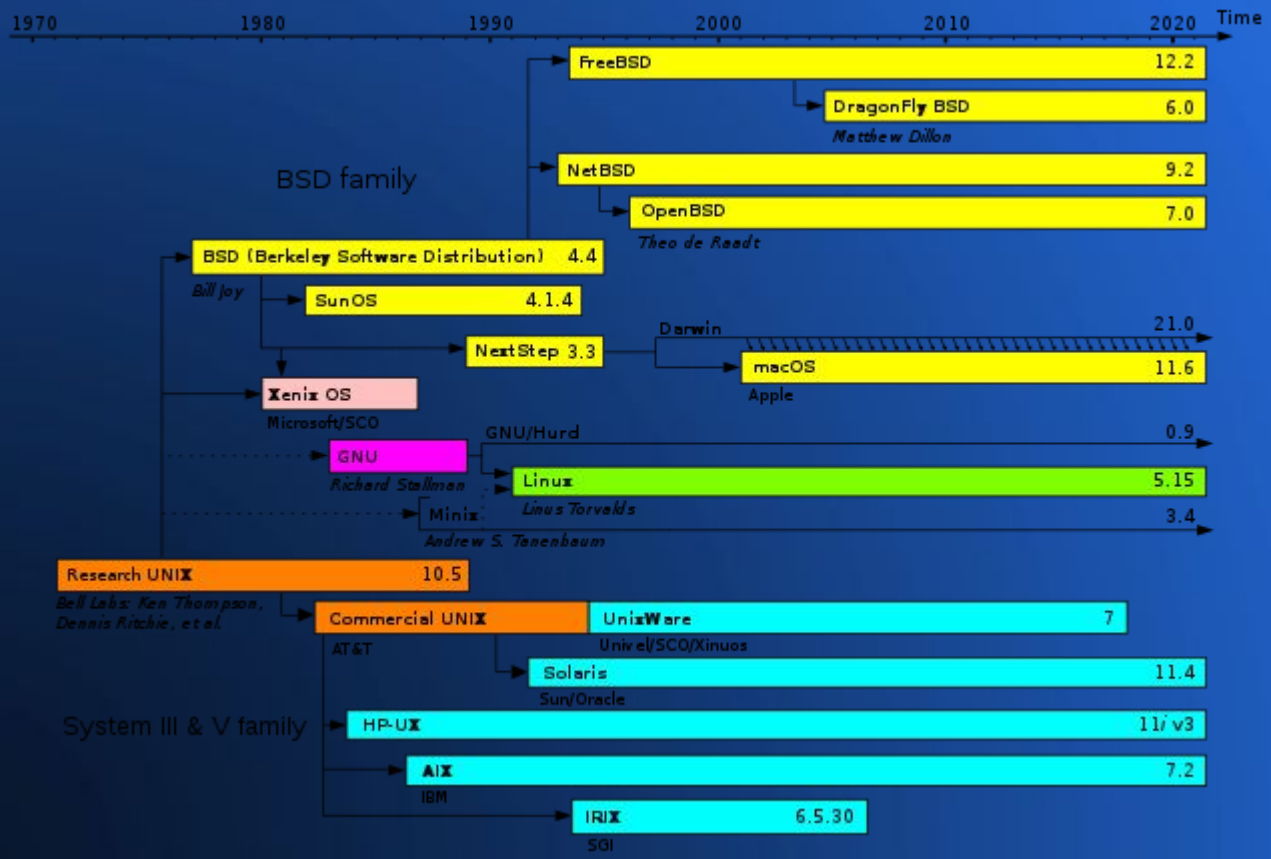
Period: 1990-1992 **Location: Outside Romania**



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- ChorusOS Michael Chien promotes mikrokernel ChorusOS (embedded unix project at Bombardier automotive systems)
- Steve Jobs pushes NeXTSTEP multitasking os based on the Mach kernel and the UNIX-derived BSD. NeXT computers changed application software development
- 3D applications for integrated circuit design & simulation pushed graphical workstation development (Intergraph (CLIX Unix), Sillincon Graphics (IRIX based on Unix sys V & BSD) & SUN Microsystems SPARC workstations (SunOS based on BSD later Soloris based on Unix Sys V). IBM AIX 3.2 (based on Sytem V) for RISC 6000 machines largely used in applications.
- 25 aug 1992 – Linus Torvalds announces Linux v 0.01 for AT-386 (as a reaction to Tanembaum MINIX). Launched 17 sept 1991 & replacing the buggy GNU Hurd kernel from FSF (a Carnegie Mellon Mach mikrokernel model, launched in 1990)

The big issue behind the above developments: BSDi distributionght process with AT&T which ended in 1994 (from 18000 files as a result of the justice verdict only 70 were deleted from BSDi). Linux filled the the user needs worldwide in 1991-1992 for AT386 PCs os. GNU utilities were ported to various computers and became standard for users & developpers. Alan Cox developped a Linux TCP/IP stack from scratch, replacing BSDi stack blocked by AT&T process.

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- Spread of various Local Area Networks; Novel Netware 3.12 (ex: Politechnica Bucharest Campus LAN with Yellow cable), Banyan Vines (Xerox company in Bucharest). CTOS Network with various protocols (Magurele & IIRUC).

- Appearance of packet switched WAN networks (RTNS named later on Equant / Global One & Logic Telecom based on Sprint packet switch networking

- TCP/IP as an interconnection solution for the various LANs (ex: IIRUC RoLink network based on SCO Unix UUCP (dial-up) and on-line connection with CTOS, Novell & RSX-11M. Jobs from territory attached to emails and redirected by Unix Listserver to Novell Netware FOX Pro LAN accounting or to RSX Indirect Command Processor

- No On-line connectivity

- Emails reaching Global Internet via Unix Gateways. Example: Politechnica Bucharest LAN connected daily by dial-up to DARMSTADT: arot@pi-bucuresti.th-darmstadt.de Dial-up to International phone numbers by Romtelecom operators.

Unix a basic tool for launching networking jobs, email, LAN communications. & projects

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Important events:

- 10.03.1992 – Founding of GURU (Romanian Unix Users Group)
- 15.05.1992 – Affiliation of GURU to EurOpen (European Federation of Unix User Groups and owner / developer of EUnet IP network in Europe, the main European Universities TCP/IP backbone). EUnet was always based on Unix platforms: UUCP before 1988; 1988 first IP links in Denmark & Netherlands, 1990 first offerings for all comers.
- oct 1992 – founding of Free Unix for Romania by Marius Hancu. Declared target: distribution of books & free software to Romania, based on volunteer funding. First Linux in Romania was installed at Laboratory of Microelectronics Systems (Lsme) dept of Electronics, prof. M Bodea
- 23-27 November 1992 GURU joining Open Forum '92 Technical Conference in Utrecht, organized by Unforum, Usenix & EurOpen

Settling of EUnet BV in Amsterdam and defining the opening procedure for EUnet nodes in all Europe as commercial IP connectivity providers (IP on-line access in 15 European Countries later in 1993). Glenn Kowak the 1st CEO of EUnet BV.

Meetings with: Larry Ellison, John Quartermann, Steve Walli (POSIX comitees) e.o One speaker from Boulder CO University Jeff Haemmer accepting to visit Romania in 1993.

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- Linux distributions for platforms, including PCs, graphical workstations & internet servers
- X/Open group started to promote open standards
- Java (Oak) invented at Sun Microsystems reaches the market in 1996 (Java 1.0)
- Open Source defined in 1998 as something different from the Free Software (Eric Raymond: “The Cathedral and the Bazaar”: Musings on Linux and Open Source by an Accidental Revolutionary 1997)
- 1993 AT&T sells USL (Unix Systems Laboratories) including copyright on Unix System V sources to Novell and Unix brand goes to X/Open
- 1995 SCO buys from Novell Unix System V rel 4 & UnixWare but looses server market due to Linux & windows NT. Finally SCO sells Unix to Calderra International
- IBM releases to Open Source Linux Kernel developer main networking packages from AIX (IBM Unix) This process is done using RedHat Linux distribution (starting with kernel 2.64). Another Unix copyright process starts between Claderra International and IBM as consequence.
- Open Group takes over kernel development. Linus Torvalds quits Transmeta corp and becomes the coordinator of Open Group Kernel Development since 1999
- Due to the evolution of Internet Tim O'Relly defines in 2000 “The Internet Operating System”

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- newsgroup soc.cult.romanian (Nick Sandru) “Free Unix for Romania” announces all events. GURU supports that in Romania starting with 1993 (distribution of free software & free donation of books to Romanian universities)
- at Open Forum 92 some speakers accept visiting Romania if a chain of conferences is started: John Quartermann, Phil Zimermann & Jeffrey Haemmer from MKS Development group among them, Planning future GURU events in Romania with Eric Allman (sendmail author) and Ellie Young exec.director USENIX. USENIX & EurOpen promised to send speakers for future Unix conferences organized in Romania.
- February 1993: GURU decide to start ROSE conferences with ROSE'93 in Cluj and looking for sponsors and subscribes as Junior Member to EurOpen chaired by UKUUG
- since 1992 ROEARN is connected 9.6 Kbps to Vienna University by BITNET. On 26 february 1993 IANA accepts to route .ro → RoTld setup. But IANA authorizes the TCP/IP packets from Romania to be routed worldwide on NSFNET only in 16 April 1993 (Romania -> W state). HP-UX Unix used for the DNS.
- O'Relly & Associates (Tim O'Relly) envolving in book donation to Romanian universities
- ROSE 93 (30 sept – 1 nov at Cluj Napoca). 5 foreign speakers, 20 companies and 500 visitors. Email provided freely by EUnet Romania. Jeff Haemmers writes to Tom Christiansen (wellknown Perl developper at Moscone Center in San Francisco about enthusiasm around ROSE'93, compared with Berkley Sockets launching in 1982 in the US)

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- november 1993 CPC SOROS center in Bucharest became “training center” for system administing of Internet nodes. GURU provides trainers & training for free. Intercomp (Moisa Trandafir & Gheorghe Rusu) install VSAT satellite link at CPC for on-line Internet connectivity 19.2Kbps to PIPEX. High-schools in the program “Computere pentru licee” connect to CPC by dialup UUCP Free Internet email access to Romanian high-schools using SCOUnix / Linux dialup system.
- 4-9 April 1994 – Unix & TCP/IP free training for Romanian high-schools which received computer donations from Soros Foundation (about 40 high schools all over Romania) - Eforie Sud
- 25-29 April 1994 – joining Moscow Conference Open Systems: Solutions for Open World. Meetings with Bill Joy & Scott Mc.Nealy from Sun Microsystems & planning a Romanian Sunsite in Politehnica Bucharest. Meetings with Doug Michales owner & founder of SCO about Linux versus SCO Unix (SCO Skunkware CD)
- 6-10 June 1994 – Boston – Usenix Anual Tehnical Conference (25 years since Unix was invented). Irina Athansiu sucessfully invites Richard Stallman, Phil Zimermann & Chet Ramey to ROSE'94 conference.
- June 1994 – PRAGA GURU joins INET''94 1st ISOC interational conference organized in Europe. Meeting with Vint Cerf, Antony Rutkowsky, John Postel, George Sadowsky e.o Antony Rutkowsky publised the article: Progresses in Romania – A Global report from GURU (Romanian Unix Users Group) in ISOC News, vol 3, no 1, march 1994”

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- 3-4 november 1994 ROSE'94 in Bucharest, Palace of Children. Richard Stallman, Phil Zimermann. Chet Ramey & 18 members of EurOpen GB joined the event (Glenn Kowak among them). The number of visitors was about 1500, growing the overall impact. EurOpen held the GB in Bucharest and some of the participants sustained lectures at Computer Science Dept in Bucharest Politechnica University. Free Unix for Romania was represented by Nick Sandru, being very active during the event (free distribution of Linux and “hand-on” demonstrations during the conference. PC-Report sustained the event.: Impact of Linux)
- Beginning of 1995: ROEDUNET changed to 64Kbps (program Dante Net), EUnet changed from 19.2Kbps Transpac to Paris to 64Kbps to Amsterdam, ICI-RNC changed also to 64Kbps. The main event in networking happened in april 1995 when CATV Kappa decided to provide Internet with TCP/IP connectivity on CATV support (up to 80 Km distance). As a result was the 1st MAN in Bucharest and later on the 1st internet exchange named BUHIX hosted by RNC. All the Internet operators use Unix servers and supported GURU ROSE events.
- 7 april 1995: TAIDE Networks presents Satellite connectivity on SCPC links and provides 64Kbps to all SOROS foundations in Central & Eastern Europe (10 mil USD contract), in Romania 4 x 64Kbps nodes (Bucharest, Cluj, Timisoara & Iasi) such connectig all high schools from CPC program to Internet

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- since 1994 until spring 1995, at the Palace of Children (the ROSE conferences venue) PACONET (the network of schools connected by dial-up) was implemented by Mihai Batrineanu with logistic support from GURU and leased line from RNC. Later-on the network was branded as PC-Net and moved out as a private company for dial-up access to the Internet, based on prepaid cards. PC-Net was initially connected at the Internet via KAPPA satellite Internet link (Loral Orion) and later on established its own satellite Internet link since 1998. It was based on Linux & Cisco equipment
- ROSE'95 1-4 November 1995 was the most relevant event from ROSE conference series, with: Linus Torvalds (inventor of Linux & GIT), Esther Dyson (founder of ICANN with John Postel in 1999), John Quartermann (one of BSD Berkeley sockets developers, author of books and Internet projects) and others. Esther Dyson moderated on Saturday 4th of November 1995 a round table with the subject: “Internet – Growth of the Global Network” with Linus Torvalds, Jean Michel-Cornu from AFUU, John Quartermann and Juan Martinez Call from Malaga University as panelists. Linus had some lectures at Computer Science dept in Politehnica Bucharest, during one week visit.
- “Securing Unix Servers and Internet access”: 3 days training, organized in Bucharest by GURU and Eurisc foundation sustained by Rick Farrow from Unix World and ROSE96: 30 Oct – 2 November 1996 were the last two events from those organized by GURU in 1993-1999 period. At ROSE'96 we had the chance to invite professor Evi Nemeth from Boulder University a well-known Unix system administration books in Tim O'Relly series.

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First exchange: BUHIX (implemented via CATV KAPPA at RNC in 1999)

BUHIX - Matricea de Peering 26-MAI-1999

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
RNC---------AS3233(1)		*	m	*	*	*	*	*	d	m	d	m	m	m	m	m
Kappa-------AS6745(2)	*		o	*	o	*	*	*	d	#	d	m	o	o	#	-
RoeduNet----AS2614(3)	m	o		-	-	-	-	-	-	-	-	-	-	-	-	-
FX----------AS8555(4)	*	o	-		-	*	*	*	-	-	-	-	-	-	-	-
DNT---------AS6846(5)	*	o	-	-		-	-	-	-	o	-	-	-	-	-	-
Mediasat----AS8751(6)	*	o	-	*	-		*	*	m	-	-	-	-	-	-	-
ITCNet------AS8614(7)	*	*	-	*	m	*		*	-	-	-	-	-	-	-	-
Canad-------AS8919(8)	*	*	m	*	m	*	*		-	m	-	o	m	-	-	-
GlobalOne---AS8338(9)	d	d	-	-	-	-	-	-		-	-	-	-	-	-	-
LogicNet----AS6715(10)	m	m	-	-	-	-	-	-	-		-	-	-	-	-	-
ESS---------AS(11)	*	*	-	*	-	*	*	*	-	-		-	-	-	-	-
Sarnets-----AS6663(12	m	o	-	-	-	m	-	-	-	-	-		-	-	-	-
Rokura------AS9160(13)	m	o	-	-	-	-	-	m	-	-	-	-		-	-	-
Mediafax----AS8930(14)	m	-	-	-	-	-	-	-	-	-	-	-	-		-	-
MobilRom----AS8953(15)	m	o	-	-	-	-	-	-	-	-	-	-	-	-		-
DIGICOM-----AS9064	m	-	-	-	-	o	-	-	-	-	-	-	-	-	-	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Legenda:
* peering direct cu
m peering multihop cu
o peering cu (dar nu prin BUHIX)
peering multihop cu (dar nu prin BUHIX)
- nu are peering
d in discutii
i este interesat sa faca peering cu

Orice alte rute intre ISP-istii de mai sus ce nu trec prin BUHIX se pot transmite prin email la peter@rnc.ro pentru actualizarea Matricei de Peering.

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Some links reffering to that period for further reading:

http://linux.punct.info/postrose.html

https://web.archive.org/web/20130325000550/http://ittrends.ro/2013/03/de-la-free-software-la-internet

https://ilgthegeek.wordpress.com/2011/08/09/internet-history-eunet-romania-un-an-de-activitate/

https://www.byte.ro/byte97-07/masa.html

https://www.academia.edu/30291963/A_long_attempt_to_promote_GNU_Linux_systems_and_free_software_into_the_Romanian_Educational_System

Hopefully there will be more links in the future !

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THANK YOU