Computing in Russia: Thirty Years after the USSR

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30 years ago…

…I published a review “Computing in the U.S.S.R.” in the BYTE magazine

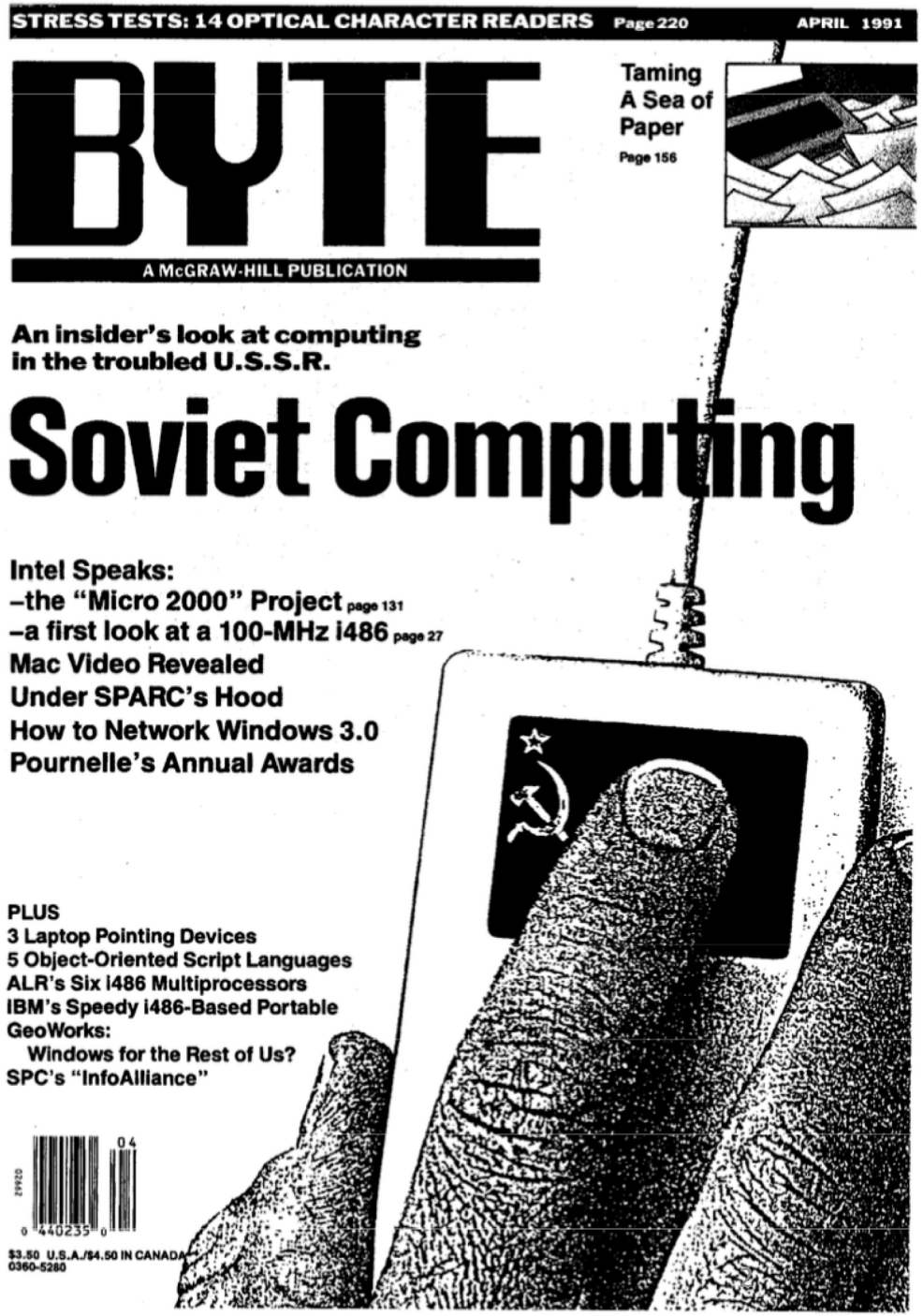
Computing in the U.S.S.R.

Soviet “informatics,” suffering from years of official policy that has hindered hardware and software development, looks toward the future

IGOR AGAMIRZIAN

On December 7, 1988, the academician Andrei Petrovich Ershov died in a Moscow hospital at the age of 57. His death went unnoticed in a country concerned with the tragic consequences of the Armenian earthquake. However, for specialists routinely dealing with computer science in their work, the event signified the end of an era.

This article is not an obituary of Ershov. It may, however, be the obituary of Soviet computer science, a demise that threatens to become the straw that breaks the back of our collapsing economy.



Main points of the 30-years old publication (0)

- In the Beginning...
  - The first computers appeared in the late 1940s and early 1950s in the U.S., Great Britain, and the U.S.S.R.
  - During 1950s and 1960s U.S.S.R. had a solid hardware development with original architectures
  - In the late 1950s and early 1960s, the U.S.S.R. established centers for the development of informatics and computer science
  - In the l960s, ALGOL occupied the leading role in the U.S.S.R. Classical Soviet developments of compilers were associated then with ALGOL
  - Scientists at the Nuclear Physics Institute in Dubna created one of the first Soviet FORTRAN compilers
  - The era of developments ended in 1968 with the appearance of the last computer in the BASM family, the BASM-6

Main points of the 30-years old publication (1)

- The Soviet Seventies
  - The American IBM Model 360 (1965) was adopted as the Unified Computer System by the Council for Mutual Economic Assistance (CMEA), or Eastern European countries
  - Everyone looked forward to the appearance of ES (“Unified System”) computers, which were to be compatible with the IBM Model 360
  - Edsger Dijkstra, a classic software engineer who visited the U.S.S.R. in the late 1970s, said in a public speech delivered in the Grand Hall of the Academy of Sciences in Leningrad that he regarded the fact that the U.S.S.R. produced IBM computers as the biggest U.S. victory in the cold war
  - A new line of Soviet computers was announced—the Elbrus—but delivery took too long

Main points of the 30-years old publication (2)

- Bypassed by the Personal Computer Revolution
  - With the advent of personal computers, a revolution broke out in the world, but it bypassed the U.S.S.R. Its leaders noticed nothing
  - Many famous specialists expressed apprehension and offered constructive steps
  - Acad. Ershov, who was well aware of the danger of further decline in informatics and computer science, put forward a slogan: “Programming is the second literacy.”
  - That slogan did the trick: A vast educational program was started, and informatics became an obligatory school subject

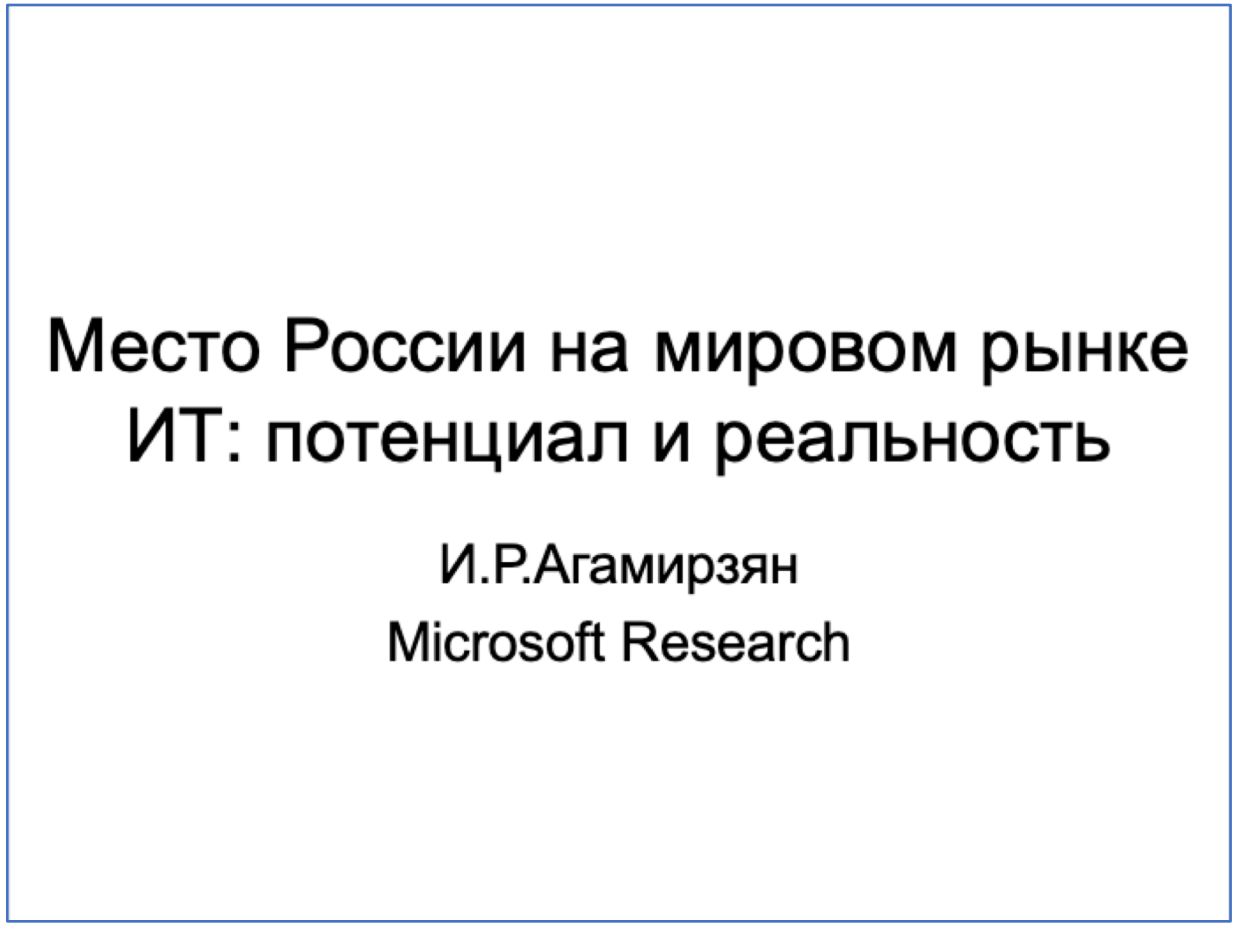
Main points of the 30-years old publication (3)

- A Few Hopeful Signs
  - However, fine efforts exist, such as the temporary science and technology team, Start, set up in 1985 to design a new generation of hardware and software
  - The result of this effort is a working model of an original and very promising multiprocessor computer and accompanying original software
  - When a successful model is made, there arises a need for large-scale ICs, whose design requires equipment the U.S.S.R. doesn't have
  - While the creation of hardware requires considerable resources, personal computers greatly reduce such requirements for software
  - This was why programming and mediator cooperatives and Centers of Scientific and Technological Creative Work of the Youth were created for the development of software products

20 years ago…

…I delivered a plenary lecture on the first Russian **Software Outsourcing Summit** (May 31 – June 1, 2001)

- It was titled ”Position of Russia on the Global IT market: Potential and Reality”



Main points of the 20-years old lecture (0)

- Potential of Russian business on the global IT-market definitely exists
- However, the reality is not the desirable one, and is not even close to the possible one
- At the same time
  - — human capital for the IT-market exists and is supported by the educational system
  - — IT-economy in Russia is growing faster than overall economy for the last 10 years
  - — recently Russian Government started to realize strategic importance of IT

Main points of the 20-years old lecture (1)

Status at the moment of the Collapse of the Soviet Union

- Non-competitive microelectronics (technological lag of 5-6 years, which corresponds to 2 generations)
- The complete absence of a modern computer base (only personal computers based on 8086 appeared, i.e. also a 2 generation gap)
- Complete absence of the software industry (though there were about 1 million software developers in the country at that moment)

Main points of the 20-years old lecture (2)

What was happening during 90-s?

- The transition of domestic microelectronics to mass products of a low degree of integration and the practical escape of microelectronics from the high-tech sector
- The rapid growth of private business focused on the import of computers and electronic components, the development of a two-tier supply model (distributors / dealers)
- Development of the "red assembly" and the emergence of relatively large manufacturers of computer equipment based on imported components

Main points of the 20-years old lecture (3)

And simultaneously…

- Multinational vendors entering the Russian market
- Fast integration of information and communication technologies
- Rapid development of the system integration market segment - from local networks to complex solutions
- Emergence of an independent network of local solution providers based on standard platforms
- Emergence of leaders in the development of application software for the local market

Main points of the 20-years old lecture (4)

Based on the numbers, there is a significant lag behind developed countries

- The number of computers in Russia is about 7 million - about 5 per 100 inhabitants (48 in Japan, 62 in the USA)
- Internet access is available to approximately 2.7% of Russian residents (16% in Japan, 53% in the USA)
- Share of the IT sector in Russia's GDP is about 0.61% (2.72% in Japan, 4.38% in the USA)
- In absolute terms, the volume of the IT market in Russia is no more than 2% of the US market

Main points of the 20-years old lecture (5)

At the same time…

- Labor productivity in the IT industry is 38% of the US level (an absolute record for the entire Russian industry, on average this figure is about 18%)
- The growth rates of the industry have averaged at least 20% per year over 10 years
- There are about 10 thousand enterprises in the industry
- There are about 1.3 million programmers in Russia
- About 200 out of about 1000 Russian universities train IT specialists

Main points of the 20-years old lecture (6)

Problems of IT-market in Russia

- Human capital problems
- Financial difficulties
- Legal problems
- Cultural issues

Main points of the 20-years old lecture (7)

Possible growth models

- Nationally restricted
  - the national IT industry works for the domestic market
- Indian-like
  - industrial development of software products by orders of Western companies
- Israeli-Scandinavian-like
  - expansion of products in the global market under a national brand

Main points of the 20-years old lecture (8)

All three at the same time!

- In the competitive market, a nationally restricted model results in formation of a limited in volume but viable industry. This is exactly what happened in Russia in the 90s.
- The global IT market is more than $ 1 trillion per year. Of these, the software market alone is about $ 150 billion. Therefore, development in the Indian and Israeli-Scandinavian models can become an important source of export income.

10 years ago…

- We discussed the progress of the Russian IT-industry on the session of St. Petersburg Economic Forum
- I presented the same slides from the Software Outsourcing Summit 2001, and the professional community of top management of the leading Russian IT-companies (both software / hardware vendors and system integrators) carefully discussed, what changed in 10 years
- Changes were definitely very significant, but problems stayed the same
  - Human capital problems
  - Financial difficulties
  - Legal problems

Progress during the first decade of the century

- Russia became one of the global leaders in the Internet penetration
- Significant number of Russian software vendors became visible and popular on the global market
  - ABBYY
  - Parallels
  - Acronis
  - Kaspersky Lab
  - …
- Local software vendors becomes super competitive on the domestic market: 1C, Yandex, Mail.ru
  - First IT IPO - MAY 24, 2011 Russian Internet company Yandex NV raised 19 percent more than expected on Monday in the sector's biggest U.S. initial public offering since Google Inc went public in 2004

Progress during the second decade of the century

- Russian Government realized the importance of IT and Digital technologies for both state governance and economic development
- State became the main domestic customer of IT systems developers and integrators
  - As a result local software developers divided into two segments – vendors on the global market and government contractors
- Government demands technological independence of IT-solutions
  - Some efforts are applied for the domestic microelectronics development – Baikal, Elbrus
  - Platform software development based on Open Source (Linux, PostgreSQL)
  - Implementation of common platform for Government Information Systems (GosTech) is in progress
- Digital services for state functions are widely available
- Private digital business ecosystems are emerging fast (Yandex, Sber)
- Huge demand for skilled personnel for both development and maintenance of IT systems
- Significant efforts in evolution of IT-education

Q&A