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Supercomputing
During the German Reunification

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SUPERCOMPUTING DURING THE GERMAN REUNIFICATION

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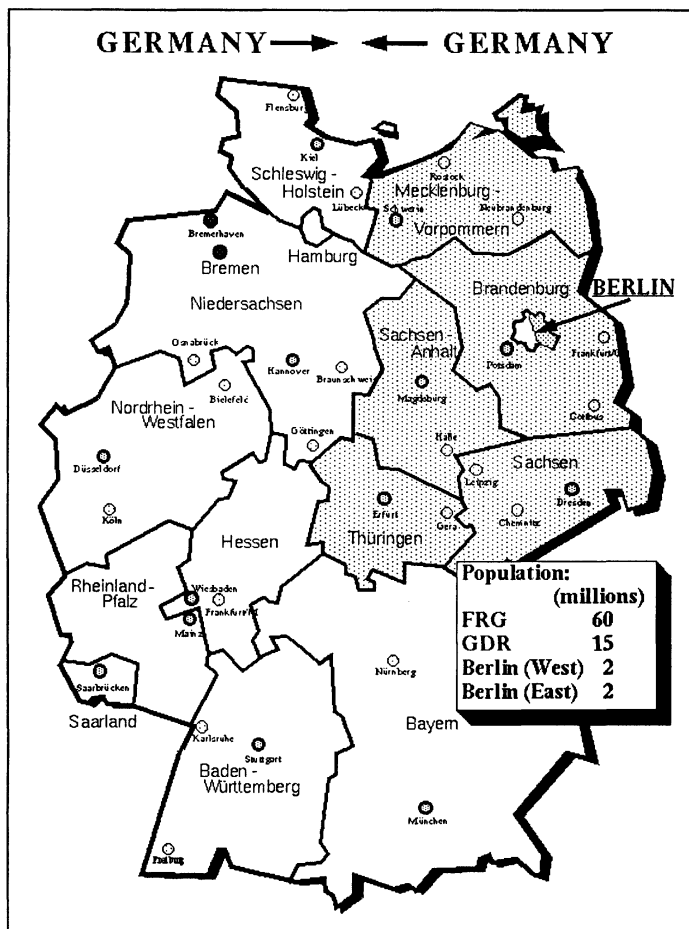
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Summary

The success of the German Reunification requires a unique migration from the traditional Eastern Block system to a modern free society. The successful migration must include a shift from a low state of the art in technology to the high level of science and technology present in the Western Community. The role of supercomputing in this transition will include leading the process of organizational change in research and development.

The paper contains a short overview on the current state of this evolution, on the currently used political and administrative tools to keep this evolution on track, and on the influence on the Konrad-Zuse-Zentrum, which is, as a Berlin institution, in the geographical and cultural center of this transformation.



Introduction

The German Reunification is a challenge that touches every area of public and private life in Germany. So the aspect of high-tech evolution or the special aspect of supercomputing is embedded in historical, political, social and financial boundary conditions and restrictions which have to be made clear or at least pointed out before we can understand what happens in the area of supercomputing.

For more than 40 years Germany was divided into two parts with totally different social and political systems. Unification occurred in a unique nonviolent revolution of the East German population under the shelter of Gorbachev's perestroika. The political powers in both parts of Germany had to follow this popular motion - willingly or not. In 1989, on November 9, the Berlin Wall tumbled down and

the frontiers opened for all Germans. Now, 18 months later, the time of joy is over and the time of work has begun.

Back to History

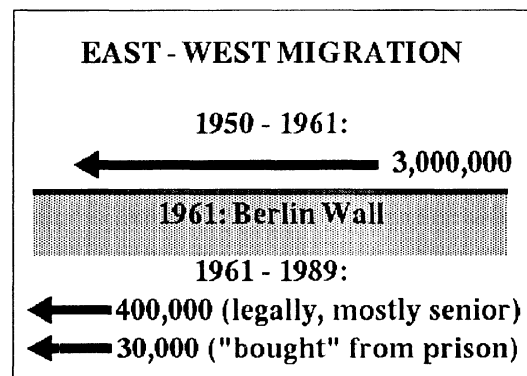
At the end of World War II the Eastern and Western parts of Germany seemed to have equal chances for political and economic regeneration. The gross national product per inhabitant was 1380 Reichsmark in the Eastern regions and 1185 Reichsmark in the West. War damage in West Germany was even bigger than in East Germany. The 10 million expellees from the former German East provinces were dispersed in a proportion of 3:7 between East and West Germany and turned out to be a major factor in the process of economic recovery. The surviving democrats of the first German democratic period, the Weimar Republic, started to work on a new political and economic system in both parts of Germany. Many of them had the vision of a new society on the basis of high ethical and social principles.

The differences evolved under the influence of the different occupying powers. After serious discussions the Western Allies decided to apply the so-called Marshall Plan for Europe and not the Morgenthau Plan. The Marshall Plan was the first move toward the establishment of the European Community. For Germany it had the result that, after the dismantling program (1945-1950), specifically the United States started to invest in Germany and to give credits for the reestablishment of economic structures and enterprises. Later on, the West German republic developed an economic system that seems to fit well to our democratic political structures. We call that economic system "Soziale Marktwirtschaft" that is usually translated with "free market economy", but the word "sozial" in the name indicates, that there are additional mechanisms to protect minorities and persons with low income. This system was established after serious discussions of alternate models, like nationalization of key branches of industry and other, even more socialistic models.

In the Eastern parts of Germany, the Soviet Union as occupying power continued the dismantling program for 10 to 15 years more. They enforced a typical Eastern Bloc economy, meaning a planned economy with nationalized industry, central management for all major production facilities and distributed functions within the Eastern Bloc. The enforced political system was of the well known authoritarian, hierarchical, socialist type. Compared to other Eastern Bloc countries the East Germans worked very successfully. But with the above mentioned handicaps of the total dismantling and the typical Eastern Bloc system, the East German system had considerable failures in performance.

From 1946 to 1961 about 15% of the East German population migrated to West Germany. These people left their homes because they wanted more freedom and welfare. In 1961 East Germany closed the frontiers and built the Berlin Wall to prevent their residents from moving to other states. From 1961 to 1989 another 400,000 people legally left East Germany, another 33,000 where "bought" by the West German Government from prison where they were arrested for years after attempting to leave the

"socialist paradise" illegally. 40 years of dogmatism and dictatorship had reduced one of the most prosperous economic regions of the earth to rubble, where the standard of living was about half of the West German standard in spite of tremendous financial support from the West German side.



First steps in November 1989

When the wall came down in November 1989, there was no outburst of national enthusiasm. However - since almost every German family was torn apart by the division of Germany - many of us felt deep emotion, when we embraced our relatives and friends who were not allowed to visit us for 28 years. There was indeed a public discussion, whether the two parts of Germany should keep apart in a sort of political collaboration or whether they should be unified. Especially in West Germany but also in East Germany many people were calling for a collaboration of two distinct states, because they wanted to keep the "socialistic achievements of the GDR".

During this first period after November 1989 the West German Computer Centers helped their East German colleagues in many ways to establish modern technology in the area of computing and networking. As the still valid COCOM regulations prohibited the delivery of supercomputers to the GDR, the West German supercomputer centers worked on modifications of the current "end use security procedures statements", thinking that there would come a period of time, where it might be possible to sell computer time to East German scientists, but not to install the latest technology in that area. At the same time the managers of the German Research Network began to plan the expansion of our scientific network to East Germany.

The necessary administrative processes for all this were so slow that none of these plans came to life. The political evolution was much faster. During 1990 the East German population voted for a quick German Reunification. The GDR revived 5 former provinces as new states and these joined the Federal Republic of Germany individually. The German constitution from 1949 gave the possibility for this annexation (art. 23 Const.). Berlin was a special political entity, so East- and West-Berlin were united in a separate procedure. Joining the FRG meant for the new East German states, that they had to accept the political and economic system of the FRG including legislation, jurisdiction and organization of public services. After 6 months of experience many of us accept, that this was the only possible procedure to bring the two parts of Germany together. However, we also know, that it will be a long and cumbersome way.

Obstacles to a quick Reunification

Major obstacles to a quick reunification were found in the following East German peculiarities:

- mental barriers after 40 years of education and experience in an authoritarian system
- monopolistic state-owned enterprises
- party and public administration are one and the same
- no independent jurisdiction
- unclear ownership of real estates
- central organization of research and education (Berlin centralism)
- domination of social and personal life by the (state-owned) factories and enterprises

The directions to overcome these obstacles were defined in the Unification Treaty. This treaty sets the end of 1991 as a deadline for the take over of all current legislation. Until then the citizens of the New German States do not have the same rights and the same protection as their West German relatives. In some cases this is advantageous for them, in some cases not. To resolve the problem of the state-owned enterprises, the Unification Treaty provides the "Treuhand" which is a Federal Trust Company, or an official receiver for 8,000 state-owned enterprises with 45,000 places of business. You may imagine that denationalizing or liquidating

45,000 places of business is the biggest job that ever had to be done by one trust company in a short period of time. The first president of the Treuhand, Karsten Rohwedder, was killed at the beginning of this month by anarchistic murderers. They knew about the vital importance of his work.

As introduction for a talk on super-computing this was a long pre-amble. As an excuse let me show the results of a recent study of managers who are willing to invest in the New German States. They were asked for items that they think will be the most important for the economic future of this area. You see, people don't learn from the past, research and education are still at the lower end of the scale.

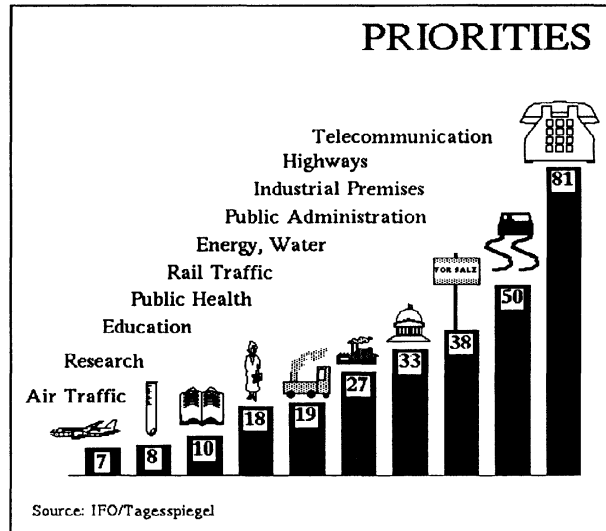
Research and Education

The research activities in the former GDR were concentrated in the Academy of Sciences. This was a huge organization of nearly 30,000 scientists. Most of this organization resided in the Berlin region. The major problems with this organization were:

- centralized structure (in the FRG the individual states are responsible for research and education)
- inefficiency of large parts of the Academy of Sciences (the management was not independent of the party)
- very little international exchange of knowledge, since most of the junior scientists were not allowed to travel or study in western countries
- computer equipment: 5 to 10 years behind current state of the art
- wasting of human resources: only persons in political key positions had access to modern (illegally imported) computers

The procedure to change this research institution is also included in the Unification Treaty: The Academy of Sciences was immediately liquidated but the employees stay to work in their institutes until July 1991. In the meantime the institutes are reviewed by the "Wissenschaftsrat", which is the Federal Science Council for Germany. This council has to coordinate the activities of the individual states of the FRG in the fields of science and education. As a consequence of our federal structure it has no right to give orders, it gives only recommendations. The reviewing process will be finished within the next few weeks. The experts proposed a separate procedure for each group of researchers to join a university or one of the western science organizations like the Max-Planck-Society, the Fraunhofer Society, one of the big laboratories of the federal agencies or whatever seemed appropriate.

One of the boundary conditions that were set by the political powers was that only about one third of the employees of the former Academy of Sciences should be kept in the new organizations. Now, close to the completion of the study, the federal government, the state governments and the management of the big scientific societies have to decide what really has to be done in each individual case. The process of closing an institution and refounding parts of



it is called "Abwicklung", which means "to unwind, to deal with, to liquidate, to transact or to run". For the universities similar procedures are valid, which I don't want to describe in detail. The problem with these procedures is that since the employees are not formally dismissed, they don't have the usual rights of dismissed or unemployed persons. It is clear that during this period of uncertainty the better qualified colleagues are moving to the western regions of Germany. Others try to improve their skills because they want to get one of the 30% remaining jobs. Depending on the speed of the restructuring process we will get either competitive, efficiently working new scientific institutes or a social disaster. The present situation is really a crisis, but every crisis contains the chance of change and new life.

Supercomputing

As a consequence of the indicated priorities we can be certain that for most of the existing supercomputer centers the budget will be shortened. On the other hand it is not likely that one can create new supercomputer centers in the New German States:

The "Wissenschaftsrat" has estimated the additional costs in the area of research institutes and education for the next 5 years in the range of 6.5 billion DM, that is about 1% of the estimated total reunification costs. You can quarrel about the correctness of these numbers, but you can be sure that getting some funding for supercomputers is an even tougher job than in the past.

As an additional difficulty we have the generic discussion on supercomputers and superminis. The general preference within the funding authorities is that you have to determine for any individual application whether it really needs a supercomputer or whether it could be done by a dedicated supermini. Only if you have enough such "approved" applications that justify a real supercomputer for a period of time you may have the chance to get some funding for a supercomputer. This is, last but not least, a question of organizational and social structures in our scientific community.

The situation of the ZIB is geographically exposed. We are in the middle of an area which is saturated with scientific research institutes. We run the only supercomputer in that area. But it is one of the smallest supercomputers in Germany, it is in fact a "minisupercomputer" with "minimemory". Now the region of Berlin does not only cover the two West Berlin universities but also the East Berlin Humboldt University and many of the institutes of the former Academy of Sciences. So we got new partners with interesting applications. Most of our colleagues from the former GDR need workstations and other basic equipment and if they are collaborating with our researchers we provide them with workstations if possible. Up to now, only few of them do really need a supercomputer but they will need one, when they want to apply our mathematical methods to more complex problems.

As we are working on better methods for scientific computing we are in the middle of discussion and collaboration for modern computational methods from all over the former GDR. Meanwhile the expanded scientific network is operational at nearly all major places where research is done and our equipment is used by researchers at various places in the New German States. Honestly I have to say that probably this year our budget will be globally squeezed by possibly 11.5%. Other institutes tell of even higher rates of budget squeezing. So the next few years will be the time for sponsors and not for vendors in East Germany.

For us the situation is not just bad because people need our CRAY, but in general the shortage of money tends to favor strange technological solutions for East German research institutes. On the one hand are West German institutes and vendors who obviously like to donate their used equipment to their East German colleagues and potential customers. On the other hand people do start experiments with small parallel systems and we try to help them to find their path in this difficult area.

If there is no money for new experiments, people like to talk about organizational changes. I cannot tell today, what changes the evaluation of the "Wissenschaftsrat" will eventually bring for our center. The federal structure of Germany makes it extremely difficult to build big institutions or to provide services for multiple German States. So we concentrate on our collaboration with researchers who have applications that cannot be done without a supercomputer and help them to find their way to a computer that is well suited to their problem. We hope to keep our current position as leading scientific service center in a rapidly changing big region.

Supercomputers in Germany

