

Success HPC Stories for SMEs

Usage cases from a Software Services company in
South-East Europe

Dr. V. Pavlov

VPR&D & CTO
Rila Solutions EAD
vpavlov@rila.bg

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Brief Company Information

- Rila Solutions EAD (<http://www.rila.com/>) was founded Sofia, Bulgaria, in 1998, as a Software Services company;
- At present we have around 80 employees;
- We provide technical, organizational and methodological assistance in the computing science and information processing domains, including HPC;
- We focus on quality and we are ISO 9001:2008 and NATO AQAP 160 Certified;

Why is HPC Used in Software Services?

- Moore's Law is approaching the physical limits;
- As of 2011, 1-CPU computers are virtually non-existent;
- The tendency will deepen and soon **all** Computing will be High-Performance;
- Computing, in one form or another, is the primary business of Software Services companies;
- Thus, in order to stay competitive, we think Software Services companies should embrace HPC **now**, the sooner – the better;

How is HPC Leveraging Our Advantage?

- By building expertise in HPC, we hope to have advantage over competing companies by being able to participate in EC- and nationally-funded projects in areas like environmental protection, public safety and industrial competitiveness;
- Our main line of thought is that we can help other industries and academia to facilitate and use HPC. Currently, we are the only software services company in Bulgaria to do so;
- We have already participated in couple of such projects, related to seismic hazard evaluation and heating infrastructure optimization;

Relation to Distinctive European Competences

- Our primary HPC activities are **to provide consultation, education and software development services to other industries and academia;**
- Since **Europe goes HPC**, our activities are directly related to this Distinctive European Competence;
- We hope that through our services, we can help HPC spread through the Bulgarian industry;
- This is a quite difficult task in a poor and conservative economy still struggling with the effects of the worldwide recession;

How do we apply HPC? – Use Case I

- Our client is the Bulgarian National Supercomputing Centre, which operates a 2-rack IBM BlueGene/P in Sofia;
- We provide technical services to the centre, including, but not limited to:
 - System administration of the machine;
 - Maintenance;
 - Technical and methodological support to the end-users;
- We also participate in all sorts of HPC training events by providing trainers with experience in distributed programming and system administration;

How do we apply HPC? – Use Case II

- Our client is the Central Laboratory of Seismical Engineering in Bulgaria;
- They used our services as an HPC consultant in a nationally-funded project for seismic hazard assessment on a large coal quarry;
- We used the package SPECFEM3D to simulate seismic wave propagation;
- The Lab provided the data for the underground model, while we did all the technicalities related to running the simulations;
- We used a 512 CPU partition of the IBM BlueGene/P machine in Sofia;

How do we apply HPC? – Use Case III

- A pilot project is underway with Toplofikacia Sofia – a municipality-owned central heating company;
- Our goal is to solve a problem related with the transitional process dynamics – what happens when a pump suddenly goes off and later on?
- Such processes lead to water waves traveling the pipes and such waves are hazardous to the infrastructure;
- Their energy can be dissipated by using damping pools;
- We hope to be able to use HPC to help design the damping pools in the most optimal way;
- We intend to use SALOME to model the infrastructure and Code Saturne CFD to perform the simulations;

Evolution of HPC Software Services

- In the next few years, we plan to focus our HPC efforts in examining scalability issues in various HPC codes and in optimizing applications for peta-scale performance;
- Another area which we actively research is novel programming languages and paradigms. We believe that the right tool for creating smart, self-adapting, highly-scalable systems is to be found within the domain of high-level abstraction languages;
- We have already made steps in this last direction, by porting SBCL – an open-source, native-code compiler/environment for Common Lisp, to IBM BlueGene/P;

- Defining sound beneficial business cases and separating the pure HPC value added part by the whole project, product or services;
- Lagging behind in project RoI which need to be compensated by factors such as higher profit or public interventions;
- Lack of sufficient networking activities in the area of HPC - sharing of information and experience;
- Getting the attention of financial institutions (banks and venture capital funds) in HPC in both directions as a consumer and as institutions that lend money to different risk projects.

THANK YOU FOR YOUR ATTENTION!