

SCIENTIFIC SOFTWARE SERVICES

WE PROVIDE OUR CUSTOMERS WITH ACCESS TO AN INTERNATIONALLY COMPETITIVE SET OF SERVICES FOR COMPUTATIONAL SCIENCE. WE OFFER FINLAND'S WIDEST COLLECTION OF SCIENTIFIC SOFTWARE, TRAINING, IN-DEPTH SUPPORT, SOFTWARE DEVELOPMENT AND ACCESS TO E-INFRASTRUCTURES.

SOFTWARE SOLUTIONS

Our software solutions cover the following research areas

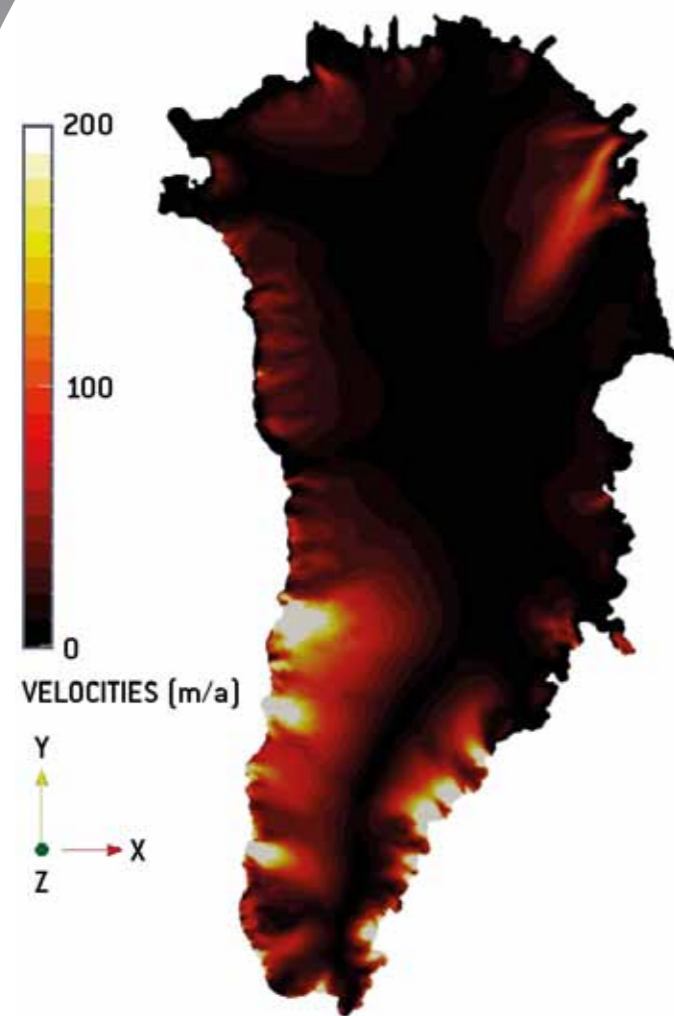
- Biosciences
- Chemistry
- Computational drug design
- Computational fluid dynamics
- Earth sciences
- Language research
- Mathematics
- Nanoscience
- Physics
- Statistics
- Structural analysis
- Visualization

We maintain a wide selection of scientific software and databases on the listed areas. The software tools are available nationally for academic use. Additionally, some software packages are purchased by a license consortium in which CSC coordinates the consortia and maintains the software installations.

CSC gives expert support in mathematical modeling, numerical methods, parallel computing and program development not limited on the listed research areas.



The pictures show simulation of elastic balls bouncing in a mobile finite element network. The simulation concerns a test run on particle tracker module carried out in the MMM@HPC project with Elmer.



A visualization of surface ice speed-up in Greenland calculated with Elmer. The study was conducted as part of a joint research project aiming to assess the global sea level rise due to climate warming.

Computation and image: Hakime Seddik, ILTS, Hokkaido University, Sapporo, Japan.

SOFTWARE ENGINEERING

We develop scientific software and easy-to-use user interfaces for science and scientific data in collaboration with the research community. We have experience also on developing software in collaboration with industry. Most of the software products developed by us are open source. Examples of software developed by us are

- Elmer, a Finite Element Multi-Physics package is an open source software developed by CSC. It offers modeling capabilities for coupled problems involving, fluid dynamics, structural mechanics, electromagnetics, heat transfer and acoustics, for example.
- Chipster is an integrative and user friendly analysis software for DNA-microarray data. Chipster has also analysis and visualization features of next generation sequencing (NGS) data. It is a comprehensive collection of state-of-the-art analysis tools in the reach of bioscientists, and we offer its user community the open source software, support and training. Also Chipster-based Embster service that contain tools for sequencing analysis is available for our customers.
- SOMA2 is a versatile modelling environment for computational drug discovery and molecular modelling. SOMA2 is operated through a web browser. The SOMA2 environment offers a full scale modelling environment from inputting molecular data to visualisation and analysis of the results. The system makes use of the scientific applications installed in the computing system for which the SOMA2 environment includes interface tools.

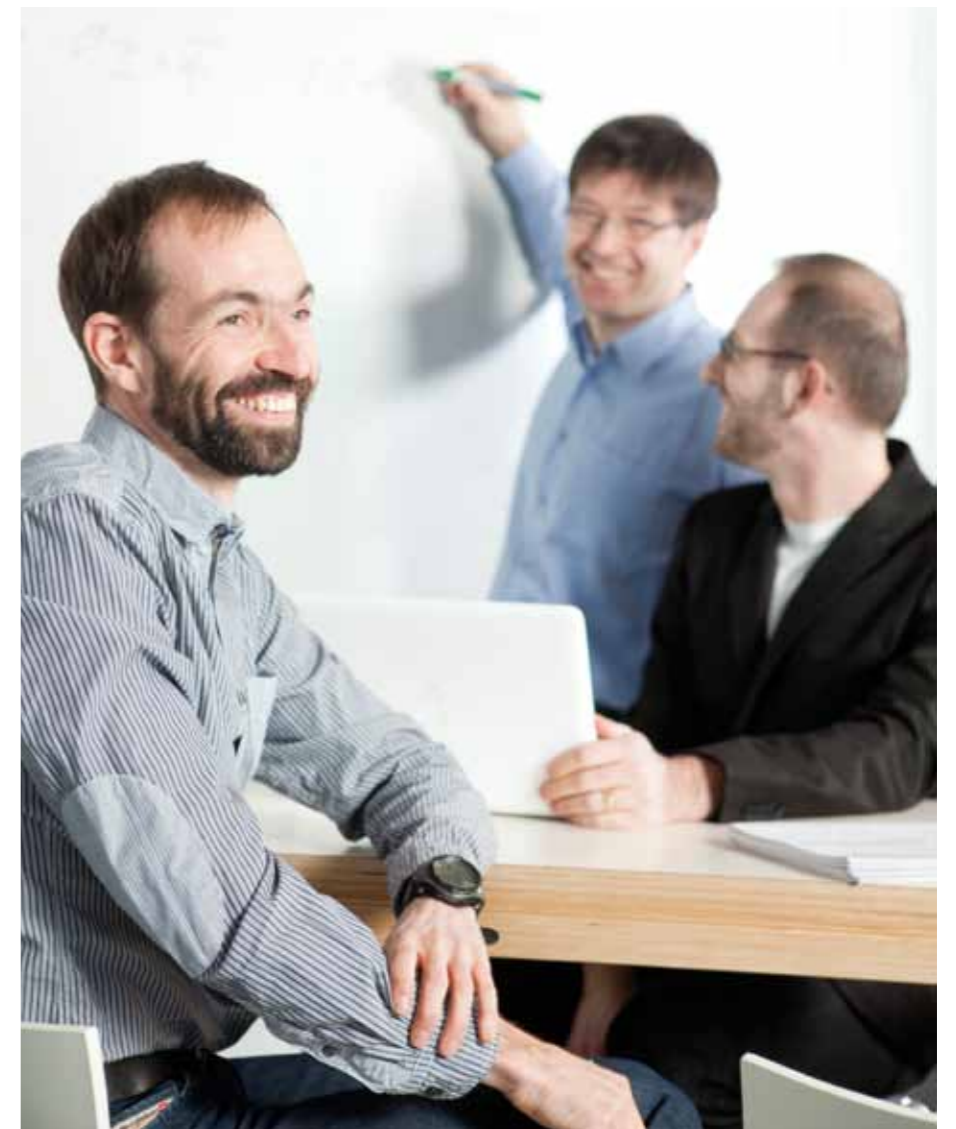
- Scientist's User Interface, an extranet service portal for researchers using CSC's services. The portal offers a single, seamless graphical user interface to many of CSC's services such as application and database resources and information services. Accessing the portal requires authentication which can be made by using either HAKA-authentication or CSC user account. Full service offering is available for those users who already have CSC user account.

TRAINING AND SUPPORT

The selection of software and database packages, and own software products, is complemented with expert support and on-line documentation. We have an extensive training portfolio that covers the application areas and also topics such as parallel programming and code optimization. We aim to give our customers efficient tools and methods for solving their computational challenges without them needing to be experts on high-performance computing.

COLLABORATION NATIONALLY AND IN EUROPE

CSC participates in essential European collaboration projects and networks in the area of e-infrastructures. Through CSC's participation the Finnish researchers can access state-of-the-art computational resources in Europe, for example petaflop supercomputers and European wide grid computing resources. We also contribute in building international research infrastructures on many fields, such as biomedical science and language research, by building on CSC's IT competence. Examples of collaboration on research infrastructures are the CLARIN and ELIXIR efforts. Extending e-infrastructure support to other areas is also planned in future.



Nationally we interact actively with our customers through various collaboration networks. As a part of this commitment a Scientific Customer Panel has been established, having merit

ed scientists from Finnish universities as members. The aim of the panel is to provide feedback for CSC's services and to provide information on emerging needs in the research community.

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Training

The scientific software services also takes part in offering a variety of courses and curricula for CSC's customers. The High-performance computing (HPC) curriculum has been a popular series of courses for last few years, containing topics like Unix environment, scripting, Fortran and Python programming languages, and parallel programming and MPI. Each of these topics is lectured in a one or two day course.

More information:
http://www.csc.fi/english/csc/courses/index_html

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Elmer ice sheet modeling

Currently one of the largest homogeneous user groups of Elmer works within glaciology, which deals with all aspects of frozen water, commonly known as ice. Especially the dynamics of ice masses (ice-sheets and -shelves and glaciers) have been objects of investigations using Elmer as the numerical tool.

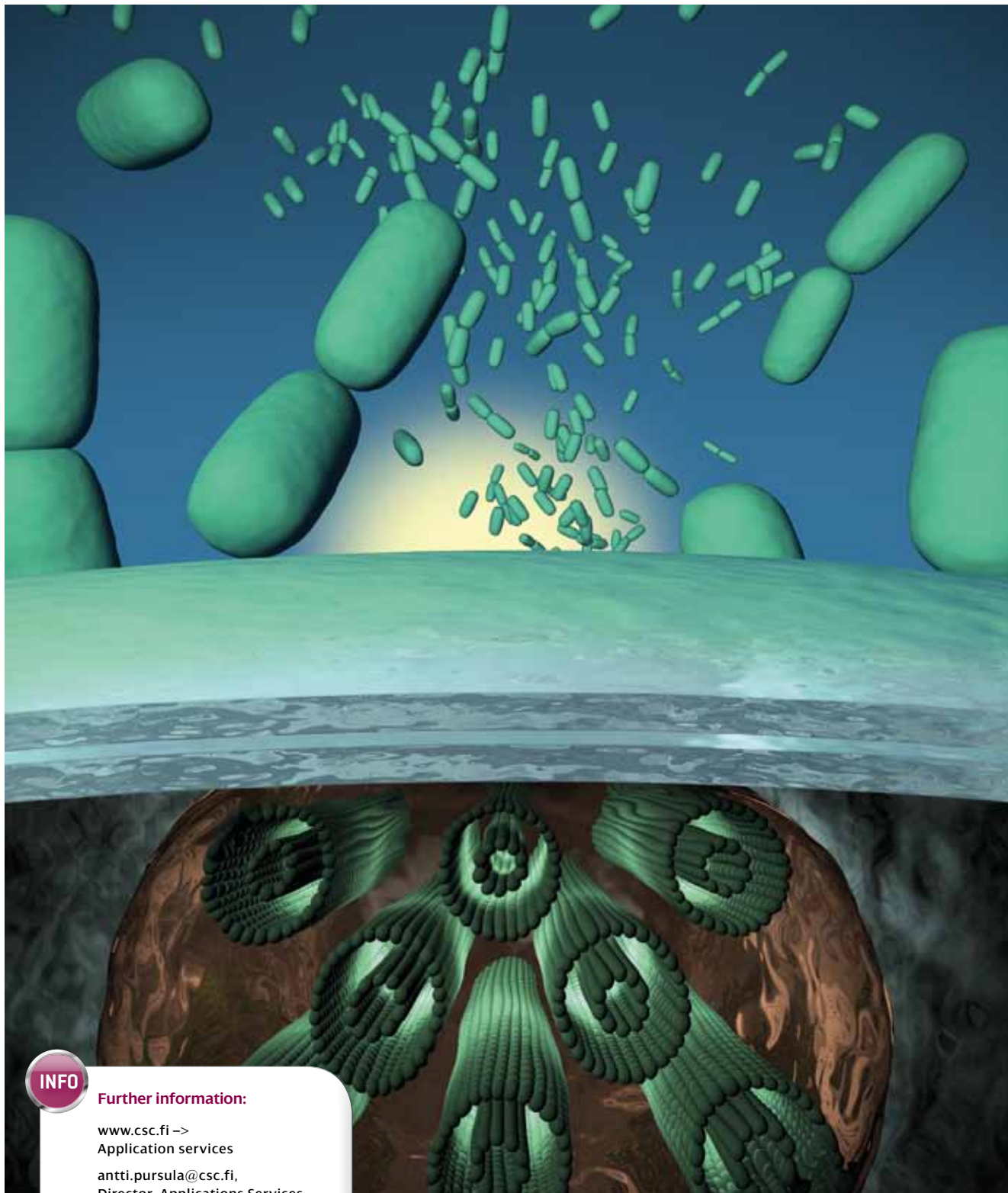
More information:
http://www.elmerfem.org/wiki/index.php/Elmer_Ice_Sheet_modeling

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Cloud Software projects

The scientific software services work towards modern cloud service infrastructure in various recent projects. In the Cloud Software program 2010-2013 funded by TEKES and TIVIT we are building a cloud-based distributed computing environment for analysis of genome data with the Chipster bioinformatics software. This work is accomplished in close co-operation with the Department of Information and Computer Science in Aalto University.

More information:
<http://www.cloudsoftwareprogram.org/>



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Further information:

www.csc.fi ->

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Green photosynthetic bacteria trap Sun's light via antenna complexes.

Juha Linnanto, Nanoscience Center, University of Jyväskylä,
visualization Jyrki Hokkanen, CSC.

Cover: Dynamo action in supernova-driven interstellar flows.

Fred Gent, Newcastle University, visualization Jyrki Hokkanen, CSC.



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