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**LUND UNIVERSITY RESEARCHERS USE MATLAB AND MATHWORKS TOOLS  
FOR PARALLEL COMPUTING TO SPEED ANALYSIS OF HEART TRANSPLANT  
RISK PROFILE**

*Faster, More Accurate Simulations to Determine Optimal Recipient and Donor Matches Raises  
Prospective Five-Year Survival Rate By Up to 10%*

**NATICK, Mass. – September 12, 2011** – [MathWorks](#) today announced that [Lund University](#), one of the world's leading research universities, used MATLAB, Neural Network Toolbox, Parallel Computing Toolbox, and MATLAB Distributed Computing Server to improve long-term survival rates for heart-transplant recipients by identifying optimal recipient and donor matches.

Researchers at Lund University and Skåne University Hospital explored the complex relationships among multiple transplant variables, including the weight, gender, age, and blood type of both donor and recipient, and the time during a transplant when there is no blood flow to the heart. Analyzing these six variables requires the simulation of 30,000 different combinations, and simulating all these combinations for 50,000 patients took weeks using an open-source software package that proved to be unstable and inaccurate.

To address the speed and reliability challenges, the researchers employed MATLAB and Neural Network Toolbox to develop predictive artificial neural network (ANN) models. The ANN models were built with donor and recipient data from two global databases: the International

Society for Heart and Lung Transplantation (ISHLT) registry and the Nordic Thoracic Transplantation Database (NTTD).

Lund researchers used Parallel Computing Toolbox to program parallel applications and MATLAB Distributed Computing Server to scale those applications to a cluster to accelerate the simulation of more than 200,000 ANN configurations. They then evaluated the results to find the best-performing configuration. The models showed that the prospective five-year survival rate for the ANN-selected patients was 5–10% higher than those matched with the criteria physicians use today.

“Many of the techniques we use are computer-intensive and time-consuming,” said Dr. Johan Nilsson, Associate Professor in the Department of Cardiothoracic Surgery at Lund University. “Working with MathWorks tools, we completed experiments that regularly took three to four weeks in about five days. Being able to access and analyze tremendous amounts of data at a fast pace helped us build and use our research models quickly.”

“The gains realized by Lund University are a prime example of how high-performance computing enables teams to develop more reliable, complex models in less time,” said Silvina Grad-Freilich, senior manager, parallel computing marketing at MathWorks. “Engineers and scientists want to solve their problems faster, and over the past decade, the ability to available hardware effectively has been a barrier to their efforts. With tools such as Parallel Computing Toolbox and MATLAB Distributed Computing Server, MathWorks is addressing this obstacle.”

### **About Lund University and Skåne University Hospital**

Lund University is one of Europe’s leading universities. Here, history and tradition lay the ground for the study and research environments of tomorrow. They offer education and research within engineering, science, law, social sciences, economics and management, medicine, humanities, theology, fine art, music and theatre. Through interaction with business and the community they ensure that knowledge and innovations benefit society. The University has 47000 students and 6300 staff from all over the world, based mainly in Lund, Malmö and Helsingborg. They work with 680 partner universities in more than 50 countries.

Skåne University Hospital is the third largest of Sweden's seven university hospitals and is part of Region Skåne. Their three cornerstones are: advanced medical care, training and prominent research. The Hospital is one of the largest emergency medicine hospitals in Sweden. They offer skilled emergency and trauma medical care, principally to the citizens within Region Skåne. The hospital has 12,500 employees. Their training and research will be to the benefit of future patients while also being of great importance for social development and economic life. 1.7 million people throughout southern Sweden are able to benefit directly from their highly specialized care.

For additional information, visit [www.lunduniversity.lu.se/](http://www.lunduniversity.lu.se/) or [www.skane.se/templates/Page.aspx?id=282103](http://www.skane.se/templates/Page.aspx?id=282103)

### **About MathWorks**

MathWorks is the leading developer of mathematical computing software. MATLAB, the language of technical computing, is a programming environment for algorithm development, data analysis, visualization, and numeric computation. Simulink is a graphical environment for simulation and Model-Based Design of multidomain dynamic and embedded systems. Engineers and scientists worldwide rely on these product families to accelerate the pace of discovery, innovation, and development in automotive, aerospace, electronics, financial services, biotech-pharmaceutical, and other industries. MathWorks products are also fundamental teaching and research tools in the world's universities and learning institutions. Founded in 1984, MathWorks employs more than 2200 people in 15 countries, with headquarters in Natick, Massachusetts, USA.

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