



SEMINAR ANNOUNCEMENT

Date: Wednesday, April 16, 2014

Time: 14:30 - 15:30

Place: Kemal Zaim Sunel Conference Hall, Faculty of Engineering
(coffee and tea will be served following the talk)

Solving Large Sparse Linear System of Equations in Parallel*

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*Parts of this talk is a joint work with Ahmed H. Sameh (Purdue University), Faisal Saied (NYU-AD), Georgios Kollias (IBM Thomas J. Watson Research Center), Ercan Bölükbaşı (METU) and Ömer Tari (METU).

Abstract. Solution of sparse linear systems in parallel computing platforms requires two main steps which are critical: (1) Reordering the sparse matrix and (2) direct or iterative algorithms for solving the reordered system of equations. In this talk we will talk about novel algorithms that improve the parallel scalability in both steps.

In the first part of this talk, we will present a new multithreaded and recursive variation of the DS factorization based parallel direct sparse solver. We show the improvement compared to the sparse LU factorization based multithreaded Pardiso direct solver on a shared memory architecture. In the second part, we will present recent results on obtaining the Fiedler vector and the permutation induced by the Fiedler vector effectively on a parallel computing platform. We will show a significant parallel improvement using our algorithm compared to a highly effective sequential counterpart in the Harwell Subroutine Library. We will also apply this permutation to extract banded preconditioner and solve the linear systems of equations in parallel using PSPIKE scheme.

If time permits, we will also present a new reordering scheme based on the largest eigenvector of the graph Laplacian. From any given sparse matrix, the new reordering scheme can create a 2×2 block form with favorable properties.

About the Speaker. Dr. Murat Manguoğlu received his bachelor's degree in Electrical and Electronics Engineering from Middle East Technical University, Ankara, Turkey in June 2002. He received his master's degree in Computational Engineering and Science from the University of Utah, Salt Lake City, Utah in May 2004. He joined the Department of Computer Science at Purdue University, West Lafayette, Indiana, as a doctoral student in August 2004. In the summer of 2008, he worked as an intern at Intel Corporation. He completed his doctoral research in May 2009. Currently, he is an Associate Professor at the Department of Computer Engineering at Middle East Technical University. His main research interests are in numerical linear algebra and parallel computing.