

## Ümit V. Çatalyürek

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### Research Interests

Graph and hypergraph partitioning, workload and data decomposition for irregular domains, scheduling, parallel graph and hypergraph algorithms, high-performance runtime systems for component architectures and data-intensive computing, parallel algorithms for scientific applications, grid computing and bioinformatics.

### Education

Ph.D. Computer Engineering and Information Science, 2000, Bilkent University, Turkey

*Thesis: Hypergraph Models for Sparse Matrix Partitioning and Reordering*

M.S. Computer Engineering and Information Science, 1994, Bilkent University, Turkey

B.S. Computer Engineering and Information Science, 1992, Bilkent University, Turkey

### Professional Experience

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|---------------------|--|--|
| Oct 2007-           | <b>Associate Professor</b>             | Dept. of Biomedical Informatics,<br>Dept. of Electrical and Computer Engineering,<br>The Ohio State University |
| Jan 2006 – Sep 2007 | <b>Assistant Professor</b>             | Dept. of Electrical and Computer Engineering,<br>The Ohio State University                                     |
| Oct 2001 – Sep 2007 | <b>Assistant Professor</b>             | Dept. of Biomedical Informatics,<br>The Ohio State University  |
| Dec 1999 – Sep 2001 | <b>Research Associate</b>              | Dept. of Pathology, Division of Informatics,<br>Johns Hopkins Medical Institutions                             |
| Dec 1999 – Sep 2001 | <b>Visiting Research Scientist</b>     | UMIACS,<br>University of Maryland, College Park  |
| Sep 1992 – Nov 1999 | <b>Teaching and Research Assistant</b> | Department of Computer Engineering and Information Science,<br>Bilkent University, Turkey                      |

### Awards, Honors and Recognition

- SBS Excellence in Research and Teaching Award, The Ohio State University, College of Medicine, 2008.
- NSF CAREER Award, 2007.
- Best paper award in Algorithms track of the 2007 International Parallel and Distributed Processing Symposium (IPDPS 2007).
- Bilkent University Scholarship, 1992 to cover full tuition and a stipend for the duration of graduate study.
- Bilkent University Scholarship, 1987 to cover full tuition and a stipend for the duration of undergraduate study.
- TUBITAK (The Scientific and Technical Research Council of Turkey) Second Prize in High School Math Contest in Marmara Region, 1987
- TUBITAK (The Scientific and Technical Research Council of Turkey) Third Prize in High School Chemistry Contest in Marmara Region, 1987

### Grants/Contracts

*Current:*

1. “Informatics methods for identifying breast cancer control genes and proteins”, *National Institutes of Health / National Cancer Institute* R01CA141090, multi-PI, jointly with K. Huang, J. D. Parvin, 6/1/2009 - 4/30/2014, \$2,387,430.
2. “High-Performance Radar Signal Processing on Emerging Architectures”, AFRL/DAGSI Ohio Student-Faculty Fellowship program, Faculty PI, jointly with T. Hartley, F. Ozguner, 6/1/08-5/31/09, \$63,084.

3. "CAREER: Scalable Combinatorial Scientific Computing", *National Science Foundation CNS-0643969*, Principal Investigator, 3/1/07-2/28/12, \$400,000.
4. "SciDAC Institute: Combinatorial Scientific Computing and Petascale Simulations (CSCAPES)", *US Department of Energy DE-FC02-06ER25775*, OSU Principal Investigator, (Alex Pothen, SciDAC Institute PI, Old Dominion University), 9/15/06-9/14/11, \$717,900 (Institute total: \$7 million).
5. "High-End Computing and Networking Research Testbed for Next Generation Data Driven, Interactive Applications", *National Science Foundation CNS-0403342*, Investigator, jointly with D.K. Panda (PI), G. Agrawal, P. Sadayappan, J. Saltz, H.-W. Shen, S. Ahalt, H. Ferhatosmanoglu, H.-W. Jin, T. Kurc, M. Lauria, D. Lee, R. Machiraju, S. Parthasarathy, P. Sinha, D. Stredney, A. E. Stutz, and P. Wyckoff, 9/1/04-8/30/09, \$3,014,063 (\$1,529,997 from NSF + \$1,484,066 from Ohio Board of Regents and OSU).

*Completed:*

6. "CSR-AES: Collaborative Research: Intelligent Optimization of Parallel and Distributed Applications (WP2)", *National Science Foundation CNS-0615155*, Investigator, 8/15/06-8/31/08, \$252,999.
7. "ITR: Collaborative Research (ASE+EVS)-(dmc+sim): Data Driven Simulation of the Subsurface: Optimization and Uncertainty Estimation", *National Science Foundation CNS-0426241*, Co-Principal Investigator, 10/01/04-9/30/08, \$200,000.
8. "SOFTWARE: Job Scheduling for Data Centers with Multi-level Storage Systems", *National Science Foundation CCF-0342615*, Co-Principal Investigator, 9/15/04-8/31/08, \$548,924.
1. "Massive-Scale Semantic Graphs" *US Department of Energy-Lawrence Livermore National Laboratories (subcontract from University of California #B541059)*, Principal Investigator, 9/1/06-10/31/07, \$158,417.
2. "Center for Grid-Enabled Medical Analysis", *National Institutes of Health - National Institute for Biomedical Imaging and Bioengineering IP20EB000591*, Co-Principal Investigator, 07/01/03-07/31/07, \$2,109,730.
3. "Parallel Hypergraph Partitioning", *Department of Energy-Sandia National Laboratories Document No: 283793*, Principal Investigator, 5/1/04-9/30/06, \$329,195.
4. "GridDB-Lite: Database Support for Data-Driven Scientific Applications in the Grid", *National Science Foundation ANI 0330612*, Co-Principal Investigator, 10/1/03-9/30/06, \$403,000.
5. "Risk-based On-line Accident Management", *US Department of Energy-Sandia National Laboratories*, Investigator, T. Aldemir (PI), 11/03/04-9/30/06.
6. "Clustering Streaming Graph Data" *US Department of Energy-Lawrence Livermore National Laboratories (subcontract from University of California #B555676)*, Principal Investigator, 10/1/05-8/31/06, \$88,668.
7. "Biomedical Informatics Synthesis Platform", State of Ohio – BRTT Program, Co-Principal Investigator, 2/1/03-7/31/06, \$6 million.
8. "NGS: An Integrated Middleware and Language/Compiler Framework for Data Intensive Applications in a Grid Environment", *National Science Foundation ACI 0203846*, Co-Principal Investigator, 9/1/02-8/31/06, \$468,068.
9. "Multi-constraint and multi-objective partitioning-complex networks", *Department of Energy-Lawrence Livermore National Laboratories (subcontract from University of California)*, Principal Investigator, 7/1/04-9/30/04, \$39,903.
10. "Collaborative telemicroscopy project", Co-Investigator, J. Saltz (PI), U.V. Catalyurek, DARPA/ SAIC/HUBS, 4/2/02-12/28/02, \$249,975.
11. "A Data Intense Challenge: The Instrumented Oilfield of the Future", *National Science Foundation ELA0121177*, Senior Personnel, 10/1/01-9/30/04, \$225,000.
12. "NPACI – Programming Tools and Environment Thrust Area, NPACI – Data Intensive Computing Thrust Area", *National Science Foundation – PACI Program ACI 9619020*, Co-Principal Investigator, 10/01/01-09/30/04, \$877,000.

13. "DataCutter: Software support for generating data products from very large datasets", *Department of Energy-Lawrence Livermore National Laboratories (subcontract from University of California)*, Co-Principal Investigator, 06/01/01-05/31/04, \$750,000.

### **Thesis**

1. Ü. V. Çatalyürek, "Hypergraph Models for Sparse Matrix Partitioning and Reordering", Ph.D. thesis, Advisor: Cevdet Aykanat, Computer Engineering and Information Science Bilkent University, November 1999.
2. Ü. V. Çatalyürek, "A Constructive Multi-way Circuit Partitioning Algorithm Based on Minimum Degree Ordering", M.S. thesis, Advisor: Cevdet Aykanat, Computer Engineering and Information Science Bilkent University, September 1994.

### **Book Chapters**

1. U.V. Catalyurek, T. Hartley, O. Sertel, M. Ujaldón, A. Ruiz, J. Saltz, and M. Gurcan, "Processing of Large-Scale Biomedical Images on a Cluster of Multi-Core CPUs and GPUs", *Trends in High Performance and Large Scale Computing*, IOS Press, 2009, to appear.
2. U.V. Catalyurek, D. Bozdag, E.G. Boman, K.D. Devine, R. Heaphy and L.A. Riesen, "Hypergraph-based Dynamic Partitioning and Load Balancing", *Advanced Computational Infrastructures for Parallel/Distributed Adaptive Applications*, Wiley Press, M. Parashar, X. Li, S. Chandra, to appear.
3. U. V. Catalyurek, S. Narayanan, O. Sertel, J. Kong, B.B. Cambazoglu, T. Pan, A. Sharma, S. Hastings, S. Langella, S. Oster, T. Kurc, M. N. Gurcan and J. Saltz, "Service-based Access to and Processing of Large Scientific Datasets", "High Performance Computing (HPC) and Grids in Action", Vol. 16 *Advances in Parallel Computing*, IOS Press, Lucio Grandinetti, Mar 2008.
4. M. Ribeiro, T. Kurc, T. Pan, K. Huang, U. Catalyurek, X. Zhang, S. Langella, S. Hastings, S. Oster, R. Ferreira and J. Saltz, "Tools for Efficient Subsetting and Pipelined Processing of Large Scale, Distributed Biomedical Image Data", *Grid Computing: The New Frontier Of High Performance Computing*, 14, Elsevier, Lucio Grandinetti, 2005.
5. T. C. Pan, D. Cowden, U. V. Catalyurek, S. Jewell, S. Hastings, S. Oster, S. Langella, T. M. Kurc, J. H. Saltz, "Virtual Microscopy: Distributed Image Storage, Retrieval, Analysis, and Visualization", *Parallel Computing in Bioinformatics*, John Wiley & Sons, Albert Zomaya, 2005.

### **Invited Articles**

1. J. Saltz, S. Oster, S. Hastings, S. Langella, R. Ferreira, J. Permar, A. Sharma, D. Ervin, T. Pan, U. Catalyurek, T. Kurc, "Translational research design templates, Grid computing, and HPC," *IEEE International Symposium on Parallel and Distributed Processing 2008 (IPDPS 2008)*, 14-18 April 2008.
2. A. Pothen, A. H. Gebremedhin, F. Dobrian, E.G. Boman, K. D. Devine, P.D. Hovland, B. Norris, J. Utke, U.V. Catalyurek, and M. M. Strout, "Combinatorial Algorithms for Petascale Science", *SciDAC Review*, No. 5, pp. 26-35, Fall 2007.

### **Refereed Articles**

#### *Journal Articles*

1. U.V. Catalyurek, E.G. Boman, K.D. Devine, D. Bozdag, R.T. Heaphy, and L.A. Riesen, "A Repartitioning Hypergraph Model for Dynamic Load Balancing", *Journal of Parallel and Distributed Computing*, Vol. 69, No. 8, pp. 711-724, Aug 2009.
2. D. Bozdag, F. Ozguner, U. V. Catalyurek, "Compaction of Schedules and a Two-Stage Approach for Duplication-Based DAG Scheduling", *IEEE Transaction on Parallel and Distributed Systems*, Vol. 20, No. 6, pp. 857-871, Jun 2009.
3. N. Vydyanathan, S. Krishnamoorthy, G. Sabin, U. Catalyurek, T. Kurc, P. Sadayappan, and J. Saltz, "An Integrated Approach to Locality Conscious Processor Allocation and Scheduling of Mixed Parallel Applications", *IEEE Transaction on Parallel and Distributed Systems*, to appear.
4. O. Sertel, J. Kong, H. Shimada, U. V. Catalyurek, J. H. Saltz and M. N. Gurcan, "Computer-aided Prognosis of Neuroblastoma on Whole-slide Images: Classification of Stromal Development", *Special Issue of Pattern*

Recognition on Digital Image Processing and Pattern Recognition Techniques for the Detection of Cancer, Vol. 42, No. 6, pp. 1093-1103, 2009.

5. S. Erdal, U. V. Catalyurek, P. R. Payne, J. Kamal, J. H. Saltz, M. N. Gurcan, "A Knowledge-Anchored Integrative Image Search and Retrieval System", *Journal of Digital Imaging*, online since 2007, Vol. 22, No. 2, pp. 166-182, 2009.
6. A. Hakobyan, K. Metzroth, T. Aldemir, R. Denning, S. Dunagan, D. Kunsman, B. Rutt, and U. Catalyurek, "Dynamic Generation of Accident Progression Event Trees", *Nuclear Engineering and Design*, Vol. 238, Issue 12, pp. 3457-3467, Dec 2008.
7. O. Sertel, J. Kong, U. V. Catalyurek, G. Lozanski, J. H. Saltz and M. N. Gurcan, "Histopathological image analysis using model-based intermediate representation and color texture: Follicular Lymphoma grading", *Journal of Signal Processing Systems for Signal, Image, and Video Technology*, 2008.
8. J. Saltz, T. Kurc, S. Hastings, S. Langella, S. Oster, D. Ervin, A. Sharma, T. Pan, M. Gurcan, J. Permar, R. Ferreira, P. Payne, U. Catalyurek, E. Caserta, G. Leone, M. C. Ostrowski, R. Madduri, I. Foster S. Madhavan, K. H. Buetow, K. Shanbhag, E. Siegel, "e-Science, caGrid, and Translational Biomedical Research," *Computer*, Vol. 41, No. 11, pp. 58-66, Nov 2008.
9. D. Bozdog, A. Gebremedhin, F. Manne, E. G. Boman, U. V. Catalyurek, "A Framework for Scalable Greedy Coloring on Distributed Memory Parallel Computers," *Journal of Parallel and Distributed Computing*, Vol. 68, No. 4, pp. 515-535, Apr 2008.
10. A. Ruiz, O. Sertel, M. Ujaldon, U. V. Catalyurek, J. H. Saltz, M. N. Gurcan, "Stroma classification for neuroblastoma on graphics processors", *International Journal of Data Mining and Bioinformatics*, to appear.
11. V. S. Kumar, B. Rutt, T. Kurc, U. Catalyurek, T. Pan, S. Chow, S. Lamont, M. Martone, J. Saltz. "Large-scale Biomedical Image Analysis in Grid Environments," *IEEE Transactions on Information Technology in Biomedicine*, Vol. 12, No. 2, pp. 154-161, Mar 2008.
12. E. G. Boman, D. Bozdog, U. V. Catalyurek, K. D. Devine, A. H. Gebremedhin, P. D. Hovland, A. Pothen, M. M. Strout, "Enabling high performance computational science through combinatorial algorithms", *Journal of Physics: Conference Series*, Vol. 78, pp. 12058, 2007.
13. H. Klie, W. Bangerth, X. Gai, M.F. Wheeler, P.L. Stoffa, M. Sen, M. Parashar, U. Catalyurek, J. Saltz, and T. Kurc, "Models, methods and middleware for grid-enabled multiphysics oil reservoir management", *Engineering with Computers*, Springer Verlag, Vol 22. No. 3, pp. 349-370, 2006.
14. X. Zhang, B. Rutt, U. Catalyurek, T. Kurc, P. Stoffa, M. Sen, and J. Saltz, "Supporting Scalable and Distributed Data Subsetting and Aggregation in Large-Scale Seismic Data Analysis", *The International Journal of High Performance Computing Applications*, Vol. 20, No 3, pp. 423-438, 2006.
15. T. Kurc, D.A. Janies, A. Johnson, S. Langella, S. Oster, S. L. Hastings, F. Habib, T. Camerlengo, D.W. Ervin, U. V. Catalyurek, and J.H. Saltz, "An XML-based System for Synthesis of Data from Disparate Databases". *Journal of the American Medical Informatics Association*, Vol. 13, No. 3, May/June, 2006
16. S. Hastings, M. Ribeiro, S. Langella, S. Oster, U. V. Catalyurek, T. Pan, K. Huang, R. Ferreira, J. H. Saltz, T. M. Kurc: "XML database support for distributed execution of data-intensive scientific workflows", *SIGMOD Record* 34(3): 50-55, September 2005.
17. T. Kurc, U. Catalyurek, X. Zhang, J. Saltz, R. Martino, M. Wheeler, M. Peszynska, A. Sussman, C. Hansen, M. Sen, R. Seifoullaev, P. Stoffa, C. Torres-Verdin, M. Parashar. "A Simulation and Data Analysis System for Large Scale, Data-Driven Oil Reservoir Simulation Studies", *Concurrency and Computation: Practice and Experience*, John Wiley and Sons, Vol. 17, No 11, pp. 1441-1467, September 2005.
18. S. Hastings, S. Oster, S. Langella, T. M. Kurc, T. Pan, U. V. Catalyurek, and J. H. Saltz, "A Grid Based Image Archival and Analysis System," *Journal of American Medical Informatics Association*, Vol. 12, No. 3, May/June 2005.
19. M. Parashar, H. Klie, U. Catalyurek, T. Kurc, V. Matossian, J. Saltz and M Wheeler. "Application of Grid-enabled Technologies for Solving Optimization Problems in Data-Driven Reservoir Studies", *FGCS – The*

International Journal of Grid Computing: Theory, Methods and Applications, Elsevier Science Publishers, Vol. 21, Issue 1, pp. 19-26, 2005.

20. C. Aykanat, A. Pinar and Ü. V. Çatalyürek, "Permuting Sparse Rectangular Matrices into Block-Diagonal Form", SIAM Journal of Scientific Computing, Vol. 25, No. 6, pp. 1860-1879, 2004.
21. S. Narayanan, T. Kurc, U. Catalyurek, J. Saltz. "Database Support for Data-driven Scientific Applications in the Grid", Parallel Processing Letters, Vol. 13, No. 2, pp. 245-271, 2003.
22. U. Catalyurek, M. D. Beynon, C. Chang, T. Kurc, A. Sussman, and J. Saltz. "The Virtual Microscope", IEEE Transactions on Information Technology in Biomedicine, Vol. 7, No. 4, pp. 230-248, 2003.
23. M. Beynon, C. Chang, U. Catalyurek, T. Kurc, A. Sussman, H. Andrade, R. Ferreira, and J. Saltz. "Processing large-scale multidimensional data in parallel and distributed environments", Parallel Computing, Vol. 28, No. 5, pp. 827-859, Special issue on Data Intensive Computing, May 2002.
24. M. D. Beynon, T. Kurc, U. Catalyurek, C. Chang, A. Sussman, and J. Saltz. "Distributed Processing of Very Large Datasets with DataCutter", Parallel Computing, Vol. 27, No. 11, pp. 1457-1478, October 2001.
25. T. Kurc, U. Catalyurek, C. Chang, A. Sussman, and J. Saltz. "Exploration and Visualization of Very Large Datasets with the Active Data Repository", IEEE Computer Graphics & Applications, Vol. 21, No. 4, pp. 24-33, July/August, 2001.
26. U. Catalyurek and C. Aykanat. "Hypergraph-Partitioning Based Decomposition for Parallel Sparse-Matrix Vector Multiplication", IEEE Transaction on Parallel and Distributed Systems, Vol. 10, No. 7, pp. 673-693, 1999.

#### *Conference Papers*

1. T. Hartley and U. Catalyurek, "A Component-Based Framework for the Cell Broadband Engine", Proceedings of 23rd International Parallel and Distributed Processing Symposium (IPDPS'09), The 18th Heterogeneous Computing Workshop (HCW 2009), May 2009.
2. D. Bozdag, J. D. Parvin, and U. V. Catalyurek, "A Biclustering Method to Discover Co-regulated Genes Using Diverse Gene Expression Datasets", Proceedings of First International Conference on Bioinformatics and Computational Biology (BICoB), 2009.
3. H. G. Ozer, D. Bozdag, T. Camerlengo, J. Wu, Y.W. Huang, T. Hartley, J. Parvin, T. Huang, U. Catalyurek, K. Huang, "A Comprehensive Analysis Workflow for Genome-Wide Screening Data from ChIP-Sequencing Experiments", Proceedings of First International Conference on Bioinformatics and Computational Biology (BICoB), 2009.
4. D. Bozdag, C. C. Barbacioru, U. V. Catalyurek, "Parallel Short Sequence Mapping for High Throughput Genome Sequencing", Proceedings of 23rd IEEE International Parallel & Distributed Processing Symposium (IPDPS'09), May 2009. *Acceptance rate 23%*.
5. S. Narayanan, U. V. Catalyurek, T. M. Kurc, J. H. Saltz, "Parallel materialization of large ABoxes", Proceedings of the 2009 ACM Symposium on Applied Computing (SAC), Honolulu, Hawaii, USA, pp. 1257-1261, 2009.
6. G. Khanna, U. Catalyurek, T. Kurc, R. Kettimuthu, P. Sadayappan, I. Foster, and J. Saltz, "Using Overlays for Efficient Data Transfer over Shared Wide-Area Networks", Proceedings of SC2008 High Performance Computing, Networking, and Storage Conference, Nov 2008. *Acceptance rate 21%*.
7. T. Hartley, U. Catalyurek, A. Ruiz, M. Ujaldon, F. Igual, R. Mayo, "Biomedical Image Analysis on a Cooperative Cluster of GPUs and Multicores", Proceedings of 22<sup>nd</sup> ACM International Conference on Supercomputing (ICS'08), Jun 2008. *Acceptance rate 26%*.
8. F. Igual, R. Mayo, T. Hartley, U. Catalyurek, A. Ruiz, M. Ujaldón. "Optimizing co-occurrence matrices on graphics processors using sparse representations", 9th International Workshop on State-of-the-Art in Scientific and Parallel Computing. Trondheim, Norway, May 2008. To appear in Lecture Notes in Computer Science.

9. G. Khanna, U. Catalyurek, T. Kurc, R. Kettimuthu, P. Sadayappan, and J. Saltz, "A Dynamic Scheduling Approach for Coordinated Wide-Area Data Transfers using GridFTP", Proceedings of 22nd IEEE International Parallel & Distributed Processing Symposium (IPDPS'08), Apr 2008.
10. O. Sertel, J. Kong, G. Lozanski, U. Catalyurek, J. Saltz, M. Gurcan, "Texture classification using non-linear color quantization: Application to histopathological image analysis", Proceedings of IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP 2008), 2008.
11. O. Sertel, J. Kong, H. Shimada, U. Catalyurek, J. Saltz, M. Gurcan, "Computer-aided prognosis of neuroblastoma: classification of stromal development on whole-slide images", Proceedings of SPIE Medical Imaging, Feb 2008.
12. O. Sertel, J. Kong, U. Catalyurek, J. Saltz, M. Gurcan, G. Lozanski, "Computerized microscopic image analysis of follicular lymphoma", Proceedings of SPIE Medical Imaging, Feb 2008.
13. A. Ruiz, O. Sertel, M. Ujaldon, U. V. Catalyurek, J. H. Saltz, M. N. Gurcan, "Pathological Image Analysis Using the GPU: Stroma Classification for Neuroblastoma", Proceedings IEEE Intl. Conference on Bioinformatics and BioMedicine (BIBM'07), pp. 78-85, Nov 2007.
14. M. N. Gurcan, J. Kong, O. Sertel, B. B. Cambazoglu, J. H. Saltz, U. V. Catalyurek, "Computerized Pathological Image Analysis For Neuroblastoma Prognosis", 2007 AMIA Annual Symposium, 2007.
15. V. S. Kumar, T. M. Kurc, J. Kong, U. V. Catalyurek, M. N. Gurcan, J. H. Saltz, "Performance vs. Accuracy Trade-offs for Large-scale Image Analysis", Proceedings of the IEEE Cluster 2007, 2007.
16. L. Weng, U. Catalyurek, T. Kurc, G. Agrawal, and J. Saltz, "Optimizing Multiple Queries on Scientific Datasets with Partial Replicas", Proceedings of the 8th IEEE/ACM International Conference on Grid Computing (GRID 2007), Sep 2007.
17. G. Khanna, U. Catalyurek, T. Kurc, P. Sadayappan, and J. Saltz, "Scheduling File Transfers for Data-Intensive Jobs on Heterogeneous Clusters", Proceedings of Euro-Par, Aug 2007. *Acceptance rate 27%*.
18. N. Vydyanathan, U. Catalyurek, T. Kurc, J. Saltz, and P. Sadayappan, "Toward Optimizing Latency under Throughput Constraints for Application Workflows on Clusters", Proceedings of Euro-Par, Aug 2007. *Acceptance rate 27%..*
19. B. B. Cambazoglu, O. Sertel, J. Kong, J. Saltz, M. N. Gurcan, U. V. Catalyurek, "Efficient Processing of Pathological Images Using the Grid: Computer-Aided Prognosis of Neuroblastoma", Proceedings of the International Workshop on Challenges of Large Applications in Distributed Environments (CLADE'07), Jun 2007.
20. T. Tavares, G. Teodoro, T. M. Kurç, R. Ferreira, D. O. G. Neto, W. Meira Jr., Ü. V. Çatalyürek, S. Hastings, S. Oster, S. Langella, J. H. Saltz, "An Efficient and Reliable Scientific Workflow System", CCGRID 2007, pp. 445-452, May 2007.
21. T. M. Kurç, X. Zhang, M. Parashar, H. Klie, M. F. Wheeler, Ü. V. Çatalyürek, J. H. Saltz, "Dynamic Data-Driven Systems Approach for Simulation Based Optimizations", International Conference on Computational Science (1) 2007, Lecture Notes in Computer Science 4487 Springer 2007, pp. 1213-1221, May 2007.
22. U. Catalyurek, E. Boman, K. Devine, D. Bozdog, R. Heaphy, L.A. Riesen, "Hypergraph-based Dynamic Load Balancing for Adaptive Scientific Computations", Proceedings of 21st IEEE International Parallel & Distributed Processing Symposium (IPDPS'07), April 2007. *Won best paper award in the Algorithms track.*
23. B. Bansal, Ü. V. Çatalyürek, J. Chame, C. Chen, E. Deelman, Y. Gil, M. W. Hall, V. Kumar, T. M. Kurç, K. Lerman, A. Nakano, Yoon-Ju Lee Nelson, J. H. Saltz, A. Sharma, P. Vashishta, "Intelligent Optimization of Parallel and Distributed Applications", Proceedings of 21st IEEE International Parallel & Distributed Processing Symposium (IPDPS'07), The Next Generation Software (NGS) Workshop, April 2007.
24. S. Krishnamoorthy, Ü. V. Çatalyürek, J. Nieplocha, A. Rountev, P. Sadayappan, "A global address space framework for locality aware scheduling of block-sparse computations", Proceedings of 21st IEEE International Parallel & Distributed Processing Symposium (IPDPS'07), The Next Generation Software (NGS) Workshop, April 2007.
25. S. Erdal, U. V. Catalyurek, J. Saltz, J. Kamal, M. N. Gurcan, "Flexible patient information search and retrieval framework: Pilot Implementation", PACS and Imaging Informatics, SPIE Symposium on Medical Imaging, 2007.

26. S. Krishnamoorthy, U. Catalyurek, J. Nieplocha, A. Rountev and P. Sadayappan, "Hypergraph Partitioning for Automatic Memory Hierarchy Management", Proceedings of SC2006 High Performance Computing, Networking, and Storage Conference, Nov 2006. *Acceptance rate 23%*.
27. V. S. Kumar, B. Rutt, T. Kurc, U. Catalyurek, S. Chow, S. Lamont, and J. Saltz, "Large Image Correction and Warping in a Cluster Environment", Proceedings of SC2006 High Performance Computing, Networking, and Storage Conference, Nov 2006. *Acceptance rate 23%*.
28. T. Hartley, U. Catalyurek, F. Özgüner, A. Yoo, S. Kohn and K. Henderson, "MSSG: A Framework for Massive Scale Semantic Graphs", Proceedings of 2006 IEEE International Conference on Cluster Computing, Sep 2006.
29. N. Vydyanathan, S. Krishnamoorthy, G. Sabin, U. Catalyurek, T. Kurc, P. Sadayappan, and Joel Saltz, "Locality Conscious Processor Allocation and Scheduling for Mixed Parallel Applications", Proceedings of 2006 IEEE International Conference on Cluster Computing, Sep 2006.
30. D. Ucar, S. Asur, U. Catalyurek, and S. Parthasarathy, "Improving Functional Modularity in Protein-Protein Interactions Graphs Using Hub-induced Subgraphs", Proceedings of the European Conference on Principles and Practice of Knowledge Discovery in Databases (PKDD), Sep 2006.
31. S. Narayanan, T. Kurc, U. Catalyurek, and J. Saltz, "On Creating Efficient Object-relational Views of Scientific Datasets", Proceedings of the 2006 International Conference on Parallel Processing (ICPP-06), Aug 2006.
32. N. Vydyanathan, S. Krishnamoorthy, G. Sabin, U. Catalyurek, T. Kurc, P. Sadayappan, and J. Saltz, "An Integrated Approach for Processor Allocation and Scheduling of Mixed-Parallel Applications", Proceedings of the 2006 International Conference on Parallel Processing (ICPP-06), Aug 2006.
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28. Xi Zhang, Tony C. Pan, Umit V. Catalyurek, Tahsin M. Kurc, Joel H. Saltz, "Serving Queries to Multi-Resolution Datasets on Disk-based Storage Clusters", BMI Technical Report: OSUBMI\_TR\_2004\_n07, The Ohio State University, Department of Biomedical Informatics, Apr 2004.
29. Gaurav Khanna, Nagavijayalakshmi Vydyanathan, Tahsin, Kurc, Umit Catalyurek, Pete Wyckoff, Joel Saltz, and P. Sadayappan. "A Hypergraph Partitioning Based Approach for Scheduling of Tasks with Batch-shared I/O," Technical Report OSU-CISRC-10/04-TR56, The Ohio State University, Department of Computer Science and Engineering, 2004.
30. Shannon Hastings, Stephen Langella, Tony Pan, Scott Oster, Umit Catalyurek, Joel Saltz, and Tahsin Kurc, "Managing Data and Image Processing Workflows for Large Scale Image Analysis," Technical Report OSU-CISRC-2/04-TR13, The Ohio State University, Department of Computer Science and Engineering, 2004.
31. Sivaramakrishnan Narayanan, Umit V. Catalyurek, Tahsin M. Kurc, Xi Zhang, Joel H. Saltz, "Applying Database Support for Large Scale Data Driven Science in Distributed Environments", BMI Technical Report: OSUBMI\_TR\_2003\_n02, The Ohio State University, Department of Biomedical Informatics, Nov 2003.
32. Tahsin M. Kurc, Feng Lee, Gagan Agrawal, Umit V. Catalyurek, Renato A. Ferreira, Joel H. Saltz, "Optimizing Reduction Computations In a Distributed Environment", BMI/CSE Technical Report: OSUBMI\_TR\_2003\_n01/ OSU-CISRC-4/03-TR20, The Ohio State University, Department of Biomedical Informatics/Department of Computer Science and Engineering, Nov 2003.

33. Shannon L. Hastings, Tahsin M. Kurc, Stephen Langella, Umit V. Catalyurek, Tony C. Pan, Joel H. Saltz, "Image Processing for the Grid: A Toolkit for Building Grid-enabled Image Processing Applications", BMI Technical Report: OSUBMI\_TR\_2003\_n03 (also OSU- CISRC-3/03-TR16), The Ohio State University, Department of Biomedical Informatics (Department of Computer Science and Engineering), May 2003.
34. J. Saltz, U. Catalyurek, T. Kurc, et al, "Driving Scientific Applications by Data in Distributed Environments," Technical Report OSU-CISRC-3/03-TR17, The Ohio State University, Department of Computer Science and Engineering, 2003.
35. Sivaramakrishnan Narayanan, Tahsin Kurc, Umit Catalyurek, and Joel Saltz, "Database Support for Data-driven Scientific Applications in the Grid," Technical Report OSUBMI\_TR\_2002\_n01 (also OSU-CISRC-2/03-TR), The Ohio State University, Department of Biomedical Informatics (Department of Computer Science and Engineering), 2002 (2003).
36. Pavan Balaji, Jiesheng Wu, Tahsin Kurc, Umit Catalyurek, D.K. Panda and Joel Saltz, "Impact of High Performance Sockets on Data Intensive Applications," Technical Report OSU-CISRC-1/03-TR05, The Ohio State University, Department of Computer Science and Engineering, 2003.
37. Michael Beynon, Chialin Chang, Umit V. Catalyurek, Tahsin M. Kurc, Alan Sussman, Henrique Andrade, Renato A. Ferreira, Joel H. Saltz, "Processing Large-Scale Multidimensional Data in Parallel and Distributed Environments", BMI Technical Report: OSUBMI\_TR\_2002\_n02, The Ohio State University, Department of Biomedical Informatics, May, 2002.
38. M. D. Beynon, T. Kurc, U. Catalyurek, A. Sussman, and J. Saltz. "A component-based implementation of iso-surface rendering for visualizing large datasets", Technical Report CS-TR-4249 and UMIACS-TR-2001-34, University of Maryland, Department of Computer Science and UMIACS, May 2001.
39. T. Kurc, U. Catalyurek, C. Chang, A. Sussman, and J. Saltz. "Exploration and visualization of very large datasets with the Active Data Repository", Technical Report CS-TR-4208 and UMIACS-TR-2001-04, University of Maryland, Department of Computer Science and UMIACS, January 2001. Also appears in IEEE Computer Graphics and Applications, July/August 2001.
40. Ü. V. Çatalyürek and C. Aykanat, "PaToH: Partitioning Tools for Hypergraphs, Version 3.0", Department of Computer Engineering, Bilkent University, November 1999.

## Professional Activities

### *Editorial*

- Subject Area Editor, Parallel Computing, Elsevier, 2008-

### *Organizing Committees:*

- Workshops Chair, 24<sup>th</sup> IEEE International Parallel & Distributed Processing Symposium (IPDPS 2010).
- Workshops Vice-Chair, 23<sup>rd</sup> IEEE International Parallel & Distributed Processing Symposium (IPDPS 2009).
- Co-Chair, Networks, Parallel and Distributed Computing track of the 24<sup>th</sup> International Symposium on Computer and Information Sciences (ISCIS 2009).
- Organizing Committee Member, Minisymposium on Combinatorial Scientific Computing and CS&E, SIAM Conference on Computational Science & Engineering (CSE09), Miami, FL, March 2, 2009.
- Organizing Committee Member, Minisymposium on Parallel Sparse Matrix Computations and Enabling Algorithms, SIAM Conference on Computational Science & Engineering (CSE09), Miami, FL, March 2, 2009.
- Organizing Committee Member, Workshop on Combinatorial Scientific Computing & Petascale Simulations, Santa Fe, NM, June 10-13, 2008.

### *Program Committee Member*

- 15th IEEE International Conference on Parallel and Distributed Systems (ICPADS'09), December 2009.
- SC Doctoral Research Showcase Committee, 2009.
- 16th IEEE International Conference on High Performance Computing (HiPC 2009), December 2009.

- The Forth SIAM Workshop on Combinatorial Scientific Computing (CSC'09), Oct 2009.
- PAPP 2009, Sixth International Workshop on aPplications of declArative and object-oriented Parallel Programming, May 2009.
- IPDPS 2009 TCPP PhD Forum, May 2009.
- Ohio Collaborative Conference on Bioinformatics (OCCBIO'09), June 2009.
- High Performance Computation Conference (HPCC'09), June 2009.
- High Performance Computing Symposium (HPC 2008), March 2009.
- 15th IEEE International Conference on High Performance Computing (HiPC 2008), December 2008.
- 14th IEEE International Conference on Parallel and Distributed Systems (ICPADS'08), December 2008.
- 22<sup>nd</sup> IEEE International Parallel & Distributed Processing Symposium (IPDPS'08), April 2008.
- High Performance Computation Conference (HPCC'08), September 2008.
- Ohio Collaborative Conference on Bioinformatics (OCCBIO'08), June 2008.
- Challenges of Large Applications in Distributed Environments (CLADE'08), June 2008.
- High Performance Computing Symposium (HPC 2008), April 2008.
- PAPP 2008, Fifth International Workshop on aPplications of declArative and object-oriented Parallel Programming, June 2008.
- High Performance Computation Conference (HPCC'07), Sep 2007.
- Challenges of Large Applications in Distributed Environments (CLADE'07), June 2007.
- High Performance Computing Symposium (HPC 2007), March 2007.
- 21<sup>st</sup> IEEE International Parallel & Distributed Processing Symposium (IPDPS'07), Apr 2007.
- Challenges of Large Applications in Distributed Environments (CLADE'06), June 2006.
- High Performance Computing Symposium (HPC 2006), April 2006.
- The 6<sup>th</sup> IEEE/ACM International Workshop on Grid Computing (Grid 2005), November 2005.
- Challenges of Large Applications in Distributed Environments (CLADE'05), June 2005.
- High Performance Computing Symposium (HPC 2005), April 2005.
- The 19th International Symposium on Computer and Information Sciences (ISCIS'04), October 2004.
- Challenges of Large Applications in Distributed Environments (CLADE'04), June 2004.

### *Referee*

#### *Proposals:*

- NSF-OCI Strategic Technologies For CI (STCI), 2007.

#### *Journals:*

- Journal on Scientific Computing, SIAM
- Transactions on Parallel and Distributed Systems, IEEE
- Journal of Parallel and Distributed Computing, Elsevier
- Parallel Computing, Elsevier

#### *Conferences:*

- IPDPS: International Parallel & Distributed Processing Symposium
- HPDC: High Performance Distributed Computing
- SC: International Conference for High Performance Computing, Networking, Storage and Analysis
- Grid: International Workshop on Grid Computing
- Cluster: Cluster Computing
- CLADE: Challenges of Large Applications in Distributed Environments
- High Performance Computing Symposium

### *Session Chair*

- 21<sup>st</sup> IEEE International Parallel & Distributed Processing Symposium (IPDPS'07), Apr 2007.
- The 6<sup>th</sup> IEEE/ACM International Workshop on Grid Computing (Grid 2005), November 2005.
- Workshop on Combinatorial Scientific Computing & Petascale Simulations, Santa Fe, NM, Jun 2008.

### *Memberships*

- Association for Computing Machinery (ACM).
- Institute for Electrical and Electronics Engineers Computer Society (IEEE-CS).

- Society for Industrial and Applied Mathematics (SIAM).

## Service

### *Biomedical Informatics Department*

- Executive Committee, 2007-present, Chair.
- P&T Committee, 2007-present, Member.
- Curriculum Committee, 2001-2006, Member, 2007-present, Chair.
- Faculty Recruiting Committee, 2001-present, Member.
- Systems Committee, 2004-2006, Chair.
- Operations Committee, 2004-2007, Member.

### *Electrical and Computer Engineering*

- Graduate Recruiting & Financial Aid, 2008-2009, Member.

### *College*

- Graduate Education Committee, College of Medicine and Public Health, 2003-2006, Member.
- IBGP Graduate Studies Committee, College of Medicine, 2007-2008, Member.
- OSUMC Research Committee, 2007-present, Member.

## Presentations

### *National/International Meetings*

- “Partitioning Sparse Matrices”, Minisymposium on Combinatorial Scientific Computing and CS&E, SIAM Conference on Computational Science & Engineering (CSE09), Miami, FL, March 2, 2009.
- “Parallel Short Sequence Mapping for High Throughput Genome Sequencing”, Dagstuhl Combinatorial Scientific Computing Seminar, Wadern, Germany, Feb 5, 2009.
- “Using Overlays For Efficient Data Transfer Over Shared Wide-Area Networks”, Supercomputing 2008 Austin, TX, Nov 20, 2008.
- “Service Oriented access to HPC Resources: A case study – OSC Bioscience Cluster”, SC’08 Workshop on Supercomputing, Multicore Architectures, and Biomedical Informatics, in conjunction with Supercomputing 2008 Austin, TX, Nov 17, 2008.
- “Processing of Large-Scale Biomedical Images on a Cluster of Multi-Core CPUs and GPUs”, International Advanced Research Workshop on High Performance Computing and Grids, July 4, 2008, Cetraro, Italy.
- “Dynamic Load Balancing & Matrix Partitioning”, Workshop on Combinatorial Scientific Computing & Petascale Simulations, Santa Fe, NM, Jun 10, 2008.
- “Tutorial: The Zoltan Toolkit”, with Karen Devine and Cedric Chevalier, Workshop on Combinatorial Scientific Computing & Petascale Simulations, Santa Fe, NM, Jun 12, 2008.
- “Multi-Objective Scheduling of Streaming Workflows”, 2nd “Scheduling in Aussois” Workshop, Aussois, French Alps. May 21, 2008.
- “Hypergraph-based Dynamic Load Balancing for Adaptive Scientific Computations”, Minisymposium on Combinatorial Scientific Computing, 6<sup>th</sup> International Congress on Industrial and Applied Mathematics (ICIAM’07), Zurich, Switzerland, Jul 16<sup>th</sup> 2007.
- “Dynamic Load Balancing for Adaptive Scientific Computations via Hypergraph Partitioning”, 21st IEEE International Parallel & Distributed Processing Symposium (IPDPS’07), Long Beach, California, March 28, 2007.
- “How Scalable is Your Load Balancer?”, Minisymposium on Combinatorial Scientific Computing and Petascale Simulations, SIAM Conference on Computational Science and Engineering (SIAM CSE’07), Costa Mesa, California, February 19-23, 2007.
- “Application of Grid Technology in Cancer Research: Middleware and Tools”, International Advance Research Workshop on High Performance Computing and Grids, Cetraro, Italy, July 6th, 2006
- “Distributed Dynamic Event Tree Generation for Reliability and Risk Assessment”, the International Workshop on Challenges of Large Applications in Distributed Environments (CLADE’06), Paris, France, June 19<sup>th</sup>, 2006.
- “Parallel Hypergraph Partitioning for Scientific Computing”, 20th IEEE International Parallel & Distributed Processing Symposium (IPDPS’06), Rhodes, Greece, Apr 2006.

- “Scheduling of Tasks with Batch-shared I/O on Heterogeneous Systems”, 20th International Parallel and Distributed Processing Symposium (IPDPS), The 15th Heterogeneous Computing Workshop (HCW 2006), Rhodes, Greece, Apr 2006.
- "STORM", Second DIALOGUE Workshop: Applications-Driven Issues in Data Grids, Edinburgh, UK, Feb 10<sup>th</sup>, 2006.
- “Servicing Seismic and Oil Reservoir Simulation Data”, VLDB Workshop on Data Management in Grids, Trondheim, Norway, Sep 2005.
- "STORM - Overview", First DIALOGUE Workshop: Applications-Driven Issues in Data Grids, Columbus OH, Aug 2<sup>nd</sup>, 2005.
- “A Hypergraph Partitioning Based Approach for Scheduling of Tasks with Batch-shared I/O”, Cluster Computing and Grid 2005 (CCGrid05), Cardiff, Wales, UK, May 2005.
- “Servicing Range Queries on Multidimensional Datasets with Partial Replicas”, Cluster Computing and Grid 2005 (CCGrid05), Cardiff, Wales, UK, May 2005.
- “Supporting Large Scale Data Driven Science in Distributed Environments”, Minisymposium on Distributed Data Management Infrastructures for Scalable Computational Science and Engineering Applications, SIAM Conference on Computational Science and Engineering (SIAM CSE'05), February 12-15, 2005.
- “Hypergraph Models for Load Balancing Irregular Applications, " mini-symposium on Load Balancing for Emerging Applications, in SIAM Conference on Parallel Processing for Scientific Computing, February 2004.
- “A Component-based Implementation of Multiple Sequence Alignment”, 18th ACM Symposium on Applied Computing (SAC2003) Bioinformatics Track, Melbourne, FL, March 2003.
- “Executing Multiple Pipelined Data Analysis Operations in the Grid”, 2002 ACM/IEEE SC2002 Conference. Baltimore, MD, November 2002.
- “A Hypergraph-Partitioning Approach for Coarse-Grain Decomposition”, 2001 ACM/IEEE SC2001 Conference, Denver, CO, November 2001.
- “A Fine-Grain Hypergraph Model for 2D Decomposition of Sparse Matrices”, International Parallel and Distributed Processing Symposium (IPDPS), 8th International Workshop on Solving Irregularly structured Problems in Parallel (Irregular 2001), San Francisco, CA, April 2001.

#### *Other Academic Institutions*

- “Combinatorial Scientific Computing on Petascale Machines”, Petascale Applications Symposium, Pittsburgh Supercomputing Center, June 22-23, 2007.
- “Parallel Hypergraph Partitioning for Scientific Computing”, Mathematics Institute, Utrecht University, the Netherlands, August 16, 2005.
- “Runtime and Compiler Support for Large Scale Data Driven Science”, Lawrence Livermore National Laboratory, Institute for Scientific Computing Research, November 17, 2004.
- “Middleware Infrastructure for Large-Scale Data Management”, ASC VIEWS Alliance Forum, Salt Lake City, Utah, July 2004.
- “Hypergraph-Partitioning Approaches for Workload Decomposition”, Discrete Algorithms and Mathematics Department, Sandia National Laboratories, July 2002.

#### *Ohio State*

- “Processing of Large-Scale Biomedical Images on a Cluster of Multi-Core CPUs and GPUs”, Ohio Supercomputer Center Workshop on Accelerating simulations with NVIDIA GPU hardware, Feb 19, 2009.
- “Parallel Short Sequence Mapping for High Throughput Genome Sequencing”, Dept. of Biomedical Informatics Research In Progress Meeting, Jan 22<sup>nd</sup>, 2009.
- “Service Oriented Bioscience Cluster at OSC”, Software Applications and Codes Meeting for the Ohio Supercomputer Center Bioscience Cluster Expansion, April 4<sup>th</sup>, 2008.
- “Task Scheduling for Data-Intensive Tasks with Batch-shared I/O”, Department of Industrial, Welding and Systems Engineering, April 25<sup>th</sup>, 2007.
- “Parallel Hypergraph Partitioning and its Applications”, Department of Electrical and Computer Engineering, June 27<sup>th</sup>, 2005.
- “Improving Performance of Multiple Sequence Alignment Analysis in Multi-client Environments”, Medical Informatics Group, June 13, 2002.
- “Virtual Microscope”, Department of Anatomy & Medical Education, February 13, 2002.