Carlos Eduardo Scheidegger

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Research Interests

- Information Visualization, Big Data, Data Analysis, Computer Graphics

Education and Professional Experience

- Assistant Professor. August 2014 –
  Department of Computer Science
  University of Arizona.
- Senior Member of Technical Staff. October 2009 – August 2014.
  AT&T Labs – Research
  Information Visualization Department, Big Data Organization.
- PhD, Computing, January 2005 – October 2009
  University of Utah
  Advisor: Prof. Cláudio Silva
- B.S., Computer Science cum laude, January 1999 – March 2004
  Universidade Federal do Rio Grande do Sul (Brazil)
  Advisor: Prof. João Comba

Honors and Awards

- National Science Foundation, NSF IIS Core Medium, IIS-1513651. U$ 268,933.00, 2015–2019.
- Best Paper Awards: Honorable Mention, IEEE VIS 2014; Honorable Mention, IEEE VIS 2013; Honorable Mention, Eurovis 2013; Winner, IEEE International Conference on Shape Modeling and Applications, 2008; Winner, IEEE VIS 2007.
- IBM PhD Student Fellowship, 2007, 2008.
- School of Computing Distinguished TA Award, 2005.
- Brazilian Computer Society Distinguished Student Award, 2004.
- Graduated cum laude in Computer Science, total combined GPA of 3.75, 2004.
- First place, Entrance exam, Computer Science, Federal University of Rio Grande do Sul, 1999.

Journal Publications

[1] *A Simple Approach for Boundary Improvement of Euler Diagrams*. P. Simonetto, D. Archambault., C. Scheidegger. IEEE Transactions on Visualization and Computer Graphics (Proceedings of IEEE VIS 2015), 22(1):678–687, 2016.

[2] *Map-based Visualizations Increase Recall Accuracy of Data*. B. Saket, C. Scheidegger, S. Kobourov, K. Börner. Computer Graphics Forum, 34(3), 2015.

[3] *An Algebraic Process for Visualization Design*. G. Kindlmann, C. Scheidegger. IEEE Transactions on Visualization and Computer Graphics. (Proceedings of IEEE VIS 2014), 20(12):2181–2190, 2014. **Honorable Mention for Best Paper Award**.

[4] *Visual Embedding – A Model for Visualization*. C. Demiralp, C. Scheidegger, G. Kindlmann, D. Laidlaw, J. Heer. IEEE Computer Graphics & Applications, 34(1):10–15, 2014.

[5] *Verifying Volume Rendering Using Discretization Error Analysis*. T. Etiene, D. Jonsson, T. Ropinski, C. Scheidegger, J. Comba, L. Nonato, M. Kirby, A. Ynnerman, C. Silva. IEEE Transactions on Visualization and Computer Graphics, 20(1):140–154, 2014.

[6] *Nanocubes for Real-Time Exploration of Spatiotemporal Datasets*. L. Lins, J. Klosowski, C. Scheidegger. IEEE Transactions on Visualization and Computer Graphics, 19(12):2456–2465, 2013 (Proceedings of IEEE VIS 2013). **Honorable mention for Best Paper award**.

[7] *Vector Field k-Means: Clustering Trajectories by Fitting Multiple Vector Fields*. N. Ferreira, J. Klosowski, C. Scheidegger, C. Silva. Computer Graphics Forum, 32(3):201–210, 2013. **Honorable mention for Best Paper award**.

[8] *Drawing Large Graphs by Low-Rank Stress Majorization*. M. Khoury, Y. Hu, S. Krishnan, C. Scheidegger. Computer Graphics Forum, 31(3):975–984, 2012.

[9] *Topology Verification for Isosurface Extraction*. T. Etiene, L. G. Nonato, C. Scheidegger, J. Tierny, T. J. Peters, V. Pascucci, R. M. Kirby, C. Silva, IEEE Transactions on Visualization and Computer Graphics, 18(6):952–965, 2012.

[10] *Combining Predictors for Recommending Music: the False Positives' approach to KDD Cup track 2*. S. Balakrishnan, R. Wang, C. Scheidegger, A. MacLellan, Y. Hu, A. Archer, S. Krishnan, D. Applegate, G. Ma, S. Au. JMLR: Workshop and Conference Proceedings, 18:1–15, 2012.

[11] *Verifiable Visualization for Isosurface Extraction*. T. Etiene, C. Scheidegger, L. G. Nonato, M. Kirby, C. Silva. IEEE Transactions on Visualization and Computer Graphics. 15(6):1227–1234, 2009.

[12] *Bandwidth Selection and Reconstruction Quality in Point-Based Surfaces*. H. Wang, C. Scheidegger, C. Silva. IEEE Transactions on Visualization and Computer Graphics. 15(4):572–582, 2009.

[13] *Edge Transformations for Improving Quality of Marching Methods*. C. Dietrich, C. Scheidegger, J. Schreiner, J. Comba, L. Nedel, C. Silva. IEEE Transactions on Visualization and Computer Graphics, 15(1):150–159, 2009.

[14] *Revisiting Histograms and Isosurface Statistics*. C. Scheidegger, J. Schreiner, B. Duffy, H. Carr, C. Silva. IEEE Transactions on Visualization and Computer Graphics (Proceedings of IEEE Visualization 2008), 14(6):1659–1666, 2008.

[15] *Edge Groups: an Approach for Understanding the Mesh Quality of Marching Methods*. C. Dietrich. C. Scheidegger, J. Comba, L. Nedel, C. Silva. IEEE Transactions on Visualization and Computer Graphics (Proceedings of IEEE Visualization 2008), 14(6):1651–1658, 2008.

[16] *VisComplete: Automating Suggestions for Visualization Pipelines*. D. Koop, C. Scheidegger, S. Callahan, J. Freire, C. Silva. IEEE Transactions on Visualization and Computer Graphics (Proceedings of IEEE Visualization 2008), 14(6):1691–1698, 2008.

[17] *Querying and Creating Visualizations by Analogy*. C. Scheidegger, H. Vo, D. Koop, J. Freire, C. Silva. IEEE Transactions on Visualization and Computer Graphics (Proceedings of IEEE Visualization 2007), 13(6):1560–1567, 2007. **Best paper award**.

[18] *Tackling the Provenance Challenge One Layer at a Time*, C. Scheidegger, D. Koop, E. Santos, H. Vo, S. Callahan, J. Freire, C. Silva, Concurrency and Computation: Practice and Experience, 20(5):473–483, 2008.

[19] *High Quality Extraction of Isosurfaces from Regular and Irregular Grids.* J. Schreiner, C. Scheidegger, C. Silva. IEEE Transactions on Visualization and Computer Graphics (Proceedings of IEEE Visualization 2006), 12(5):1205–1212, 2006.

[20] *Direct (Re)Meshing for Efficient Surface Processing.* J. Schreiner, C. Scheidegger, S. Fleishman, C. Silva. Computer Graphics Forum (Proceedings of Eurographics 2006), 25(3):527–536, 2006.

[21] *Practical CFD simulations on the GPU using SMAC.* C. Scheidegger, J. Comba, R. Cunha. Computer Graphics Forum, 24(4):715–728, 2005.

[22] *Computation on GPUs: from a programmable pipeline to an efficient stream processor*. J. Comba, C. Dietrich, C. Pagot, C. Scheidegger. Revista de Informática Teórica e Aplicada, 10(1):41–70, 2003.

Conference Publications

[23] *Certifying and Removing Disparate Impact*. M. Feldman, S. Friedler, J. Moeller, C. Scheidegger, S. Venkatasubramanian. Proceedings of KDD'15, the 21th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining, 2015.

[24] *Collaborative Visual Analysis with RCloud* G. Woodhull, S. Urbanek, C. Scheidegger, S. North. IEEE VIS 2015 (VAST conference paper).

[25] *Towards Understanding Enjoyment and Flow in Information Visualization*. B. Saket, S. Kobourov, C. Scheidegger. EuroVis 2015 (short paper).

[26] *Multilevel Agglomerative Edge Bundling for Visualizing Large Graphs*. E. Gansner, Y. Hu, S. North, C. Scheidegger. IEEE Pacific Visualization Symposium, 2011.

[27] *The Provenance of Workflow Upgrades*. D. Koop, C. Scheidegger, J. Freire, C. Silva. International Provenance and Annotation Workshop, 2010.

[28] *End-to-End eScience: Integrating Workflow, Query, Visualization, and Provenance at an Ocean Observatory*, B. Howe, P. Lawson, R. Bellinger, E. Anderson, E. Santos, J. Freire, C. Scheidegger, A. Baptista, C. Silva. IEEE International Conference on e-Science 2008.

[29] *Toward Provenance-Enabling ParaView*, S. P. Callahan, J. Freire, C. Scheidegger, C. Silva, H. Vo. Second International Provenance and Annotation Workshop (IPAW 2008).

[30] *Optimal Bandwidth Selection for MLS Surfaces*, H. Wang, C. Scheidegger, C. Silva. Proceedings of Shape Modelling International (SMI), 2008. **Best paper award**.

[31] *Examining Statistics of Workflow Evolution Provenance: A First Study*, L. Lins, D. Koop, E. Anderson, S. P. Callahan, E. Santos, C. Scheidegger, J. Freire, C. Silva. Proceedings of the 20th International Conference on Scientific and Statistical Database Management (SSDBM), 2008.

[32] *Querying and Re-Using Workflows with VisTrails* C. E. Scheidegger, H. T. Vo, D. Koop, J. Freire, C. Silva. Demo, ACM SIGMOD 2008.

[33] *Hardware-Assisted Point-Based Volume Rendering of Tetrahedral Meshes*, E. Anderson, S. Callahan, C. Scheidegger, J. Schreiner, C. Silva. Proceedings of the Brazilian Symposium on Computer Graphics and Image Processing (SIBGRAPI 2007).

[34] *Managing Rapidly-Evolving Scientific Workflows.* J. Freire, C. Silva, S. Callahan, E. Santos, C. Scheidegger, H. Vo. Proceedings of the International Provenance and Annotation Workshop (IPAW), 2006. Invited paper.

[35] *Managing the evolution of dataflows with VisTrails.* S. Callahan, J. Freire, E. Santos, C. Scheidegger, C. Silva, H. Vo. Proceedings of the IEEE Workshop on Workflow and Data Flow for Scientific Applications (SciFlow), 2006.

[36] *VisTrails: Visualization Meets Data Management.* S. Callahan, J. Freire, E. Santos, C. Scheidegger, C. Silva, H. Vo. Demo, ACM SIGMOD 2006.

[37] *VisTrails: Enabling Interactive Multiple-View Visualizations*. L. Bavoil, S. Callahan, P. Crossno, J. Freire, C. Scheidegger, C. Silva, H. Vo, Proceedings of IEEE Visualization, pages 135-142, 2005.

[38] *Triangulating Point-Set Surfaces With Bounded Error.* C. Scheidegger, S. Fleishman, C. Silva. Proceedings of the third Eurographics/ACM Symposium on Geometry Processing, pages 63-72, 2005.

[39] *Boolean Operations on Surfel-Bounded Solids Using CBSP-Trees.* M. Farias, C. Scheidegger, J. Comba, L. Velho. Proceedings of SIBGRAPI 2005 (XVIII Brazilian Symposium on Computer Graphics and Image Processing).

[40] *Navier-Stokes on Programmable Graphics Hardware using SMAC.* C. Scheidegger, J. Comba, R. Cunha, Proceedings of XVII SIBGRAPI – II SIACG 2004, pages 208-315, 2004.

Other

[41] *VisTrails.* Juliana Freire, David Koop, Emanuele Santos, Carlos Scheidegger, Claudio Silva, and Huy T. Vo. Book chapter, in *Architecture of Open Source Applications, Vol. 1.* A. Brown, G. Wilson (eds.). 2011.

[42] *Provenance of Exploratory Tasks in Scientific Visualization: Management and Applications*. C. Scheidegger. Thesis. 2009.

[43] *Direct Volume Rendering: A 3D Plotting Technique for Scientific Data.* S. Callahan, J. Callahan, C. Scheidegger, C. Silva. IEEE/AIP Computing in Science and Engineering, 10(1):88–92, 2008.

[44] *A Unified Projection Operator for MLS Surfaces.* T. Ochotta, C. Scheidegger, J. Schreiner, Y. Lima, R. M. Kirby, C. Silva. SCI Institute Tech Report UUSCI-2007-006.

[45] *Visualization in Radiation Oncology: Towards Replacing the Laboratory Notebook.* E. Anderson, S. Callahan, G. T. Y. Chen, J. Freire, E. Santos, C. Scheidegger, C. Silva, H. Vo. *Manuscript.*

[46] *Using Provenance to Streamline Data Exploration through Visualization.* S. Callahan, J. Freire, E. Santos, C. Scheidegger, C. Silva, H. Vo. *Manuscript.*

[47] *GPUs como processadores de propósito geral.* (In portuguese: GPUs as general purpose processors) C. Scheidegger. B.Sc. thesis. Advisor: Prof. Dr. J. Comba. December 2003.

Software contributions

- *Nanocubes*. One of the developers of nanocubes, an in-memory data-structure for fast spatiotemporal aggregation queries. Available at http://github.com/laurolins/nanocube.
- *RCloud*. One of lead designers and developers of Rcloud, an open-source environment for writing and sharing exploratory data analysis scripts in R over a web browser. Available at http://github.com/att/rcloud.
- *Lux*. Lead designer and developer of Lux, an open-source domain-specific language for writing WebGL programs. Available at http://github.com/cscheid/lux.
- *VisTrails*. Until 2009, one of the lead designers and developers of VisTrails, an open source provenance-aware system for exploratory scientific workflows and visualization. Available at http://www.vistrails.org.
- *Afront*. One of the developers of Afront, a program to generate well-shaped triangle meshes out of many different types of input data. Available at http://afront.sourceforge.net.
- *Macet*. One of the developers of Macet, a variant of Marching Cubes geared towards generation of high-quality meshes. Available at http://www.sci.utah.edu/~cscheid/vis2008/edge_groups .
- *PGHFlow*. Lead designer and developer for PGHFlow, a system for solving the uncompressible Navier-Stokes equations on programmable graphics hardware. Available at http://www.sci.utah.edu/~cscheid/smac.

Service

Journal Reviewer ACM Transactions on Graphics, IEEE Transactions on Visualization and Computer Graphics, Computer Graphics Forum, IEEE Computer Graphics and Applications, International Journal of Computational Geometry and Applications.

Conference Reviewer ACM SIGGRAPH, EG Geometry Processing, Eurographics conference, IEEE Visualization, IEEE Information Visualization, ACM Conference on Information and Knowledge Management, IEEE Big Data, SIAM International Conference on Data Mining.

Program Committees ACM Conference on Information and Knowledge Management, 2012 and 2013. IEEE Big Data, 2013 and 2014, VPA 2014 and 2014. InfoVis 2015.

Events Co-Chair, EuroRV3 2015: the EuroVis Workshop on Reproducibility, Verification, and Validation in Visualization. Co-organizer, FATML 2015: Fairness, Accountability and Transparency in Machine Learning (to be colocated at ICML 2015).

NSF Panel participant for grant reviews, NSF IIS 2011, 2015.

Invited Talks

- *Exploratory Visualization for Big Data*. Colloquium at University of Chicago, Apr. 2nd 2014
- *Exploratory Visualization for Big Data*. Colloquium at University of Arizona, Jan. 28th 2014
- *Verifying Isosurface Extraction*. Keynote at Graduate Student Research Day, SUNY Stony Brook, Apr. 29th 2011
- *Provenance in Scientific Visualization*. Colloquium at Rutgers University, Apr. 23rd 2009
- *Provenance in Scientific Visualization*. Colloquium at Washington University in St. Louis, Apr. 10th 2009
- *Provenance in Scientific Visualization*. Invited talk at the Computation Institute at the University of Chicago, Apr. 8th 2009
- *Provenance in Scientific Visualization*. Invited talk at AT&T Research, Florham Park, NJ, Feb. 26th 2009
- *Provenance in Scientific Visualization*. Colloquium at Brown University, Feb. 23rd 2009

Detailed Professional Experience

- *Assistant Professor, Department of Computer Science, University of Arizona*. August 2014 – present.
- *Senior Member of Technical Staff at AT&T Labs – Research*. October 2009 – August 2014.
- *Intern at VisTrails Inc*. Supervisor: Dr. Steven Callahan. Summer 2008.
- *Research Intern at the IBM Watson Research Center*. Supervisor: Dr. Wagner T. Correa. Summer 2006.
- *Research Intern at Lawrence Livermore National Laboratories*. Research topics: Point-based graphics and computational topology. Supervisor: Dr. Valerio Pascucci. Summer 2005.
- *Teaching Assistant for CS3510: Algorithms and Data Structures*. Supervisor: Prof. Cláudio Silva. Jan 2005 – May 2005.
- *Research Intern at the University of Utah*. Topics: Point-based graphics and algorithms. Supervisor: Prof. Cláudio Silva. May 2004 – Aug 2004.
- *Undergraduate Research Assistant*. Research topics: Applied computational geometry and GPU-based algorithms. Supervisor: Prof. João Comba. Department of Computer Science, Federal University of Rio Grande do Sul. Aug 2002 – Dec 2004.
- *Undergraduate Research Assistant*. Research topics: Computer-Aided Design, Geographical Information Systems. Supervisor: Prof. Benamy Turkienicz. Department of Architecture, Federal University of Rio Grande do Sul. Feb 2001 – Jul 2002.

Language Skills

- English: fluent
- Brazilian Portuguese: native