RESUME

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Education

Ph.D., 1996, Indian Institute of Technology, Delhi, India

M.S., 1990, Indian Institute of Technology, Delhi, India.

Work Experience

Research Experience: 14 Years

Jul'02 – Present **Assistant Professor, Department of Computer Science & Engineering, Indian Institute of Technology, Delhi, India** (http://www.cse.iitd.ac.in)

> **Teaching:** Scientific Computing: Parallel, Distributed and Grid Computing.
> **Research:** Scientific Applications, Parallel, Distributed and e-science (Grid computing), Parallel and Grid I/O.

> **Director Technical,** SUN Microsystems' Asia Pacific Science and Technology Facility (APSTF), IIT Delhi, India

> **Director Technical,** GridLogics Technologies (P) Ltd, Pune India. (http://www.gridlogics.com)

> **Director Technical/Chief Scientist**, GridSolv Software Pvt. Ltd, IIT Delhi, India: A Start-up under IIT Delhis' Technology Business Incubation Unit (TBIU) of FITT. (http://www.gridsolv.com)

> **Consultant,** Madhya Pradesh State Electricity Board, Govt. of MP State, India

Nov.96 – June'02 **Member Technical Staff, Seismic Data Processing Group, Centre for Development of Advanced Computing (C-DAC), Pune, India.**

Responsible for the development and validation of algorithms for scientific and engineering applications such as Computational Fluid Dynamics, Seismic Data Processing for oil exploration etc.

Responsible for the development of parallel codes for Seismic Data Processing on the PARAM series of supercomputers developed by C-DAC, India. Also Responsible for carrying out Seismic Data Processing of real data sets from Oil Companies on commercial basis.

Actively participated in designing specifications for PARAM series of supercomputers and developing storage subsystem architecture for Clusters.

Aug'01 – Jan'02 **Research Geophysicist, Veritas DGC Inc, Houston, TX, USA**.

Responsible for developing parallel poststack, prestack migration and modeling algorithms and applications for Oil exploration data.

Conducted research on various issues related to cluster computing, parallel I/O and various parallel solvers.

May'01 – Aug'01 **Postdoctoral Researcher**, **Electrical & Computer Engineering Department, Northwestern University, Evanston, IL 60208-3118 USA**

	Worked on the project "GriPhyN: Grid Physics Network", funded by National Science Foundation USA.
	Conducted research on issues related to **parallel I/O** for Geophysical applications (Seismic Migration and Modelling) and CFD. Also worked on implementation of Physics applications in **Grid Computing** environment.
Jun'01 – Aug' 01	**Guest graduate researcher**, Mathematics & Computer Science Division, **Argonne National Laboratory, Chicago, IL USA**
	Worked on various aspects of performance issue related to Parallel, Distributed and **Grid** Computing applications.
May' 00 – Apr' 01	**Visiting Scientist, Information Technology Services Department, Eastern Illinois University, Charleston, IL 61920 USA**
	Responsible for building a scalable LINUX cluster using Pentium class of PCs for parallel processing: **Developed a Parallel Panther Beowulf Cluster.**
	Responsible for carrying out **teaching** and research in the area of parallel processing:
	Developed a course on "writing parallel scientific applications on clusters". The course material addresses various aspects related to design of parallel computers, parallel architectures, parallel algorithms, and writing highly optimised parallel applications. It also discusses issues related to parallel I/O.
	Conducted research in area of Seismic Data Processing and Computational Fluid Dynamics.
Jan.99 – April'00	Resource Faculty, Interdisciplinary School of Scientific Computing, University of Pune, Pune (India).
	Responsible for teaching courses on "Parallel Computing" to Master of Computer Science students.
Aug. 97 - Dec. 97	Visiting Scientist, Department of Mathematics, **Eastern Illinois University, Charleston, IL 61920 (USA).**
	Carried out research on the development of algorithms for solving non-linear partial differential equations in Computational Fluid Dynamics. **Taught** a course on Algebra to Undergraduate students.
Jul. 96 - Oct. 96	Lecturer, Department of Computer Science, Birla Institute of Technology & Science, Pilani, India.
	Taught Computer and Programming and Numerical Analysis courses to undergraduate students. Also worked on **course development** and admission procedure in Distance Learning Programme Division.
Mar. 96 - Jun. 96	Research Associate, Department of Mathematics, Indian Institute of Technology, Delhi, India.
	Worked on the project titled "Development of computer algorithms for partial differential equations governing physical aspects", funded by Council for Scientific and Industrial Research, Government of India.
	Taught several Mathematics and **Computer programming** courses at undergraduate and postgraduate levels.

Editor

Assistant Editor: *International Journal of Applied Science and Computations.*
(Published by Institute of Applied Science and Computations, USA)

Awards and Honours

Young Scientist selected by British Council under the Young Scientist Network program between India and UK 2002.

Young Scientist Award for year 2000 by Indian National Science Academy (INSA) for

> Innovative numerical solutions of many types of differential equations, using parallel algorithms and outstanding applications to important practical problems

Young Scientist Project Award 1998 by Department of Science & Technology, Govt. of India for

> Development of Parallel Solvers for Hyperbolic System of Equations and their Applications to Some Industrial Problems

Invited Seminar at NASA-Ames Research Center, California (USA) under their New Technology Seminar series on

> Solving PDEs for Some Real Problems on Parallel Computers. August 2, 2001

Visiting scientist, Istituto Per Applicazioni Della Matematica, Napoli (Italy), 1998,1999.

Member Research Board of Advisors, The American Biographical Institute 1999.

Name included in the millennium edition of Marquis' Who's Who' 1999.

Awarded CNR International fellowship of Italy 1997.

Awarded Research Associateship by Council for Scientific and Industrial Research, Govt of India, 1995-96.

Vice President, Mathematics Society, Indian Institute of Technology, Delhi, India, 1992 - 1995.

Senior Research Fellow, Dept. of Mathematics, Indian Institute of Technology, Delhi, 1993-1995

Qualified National Eligibility Test (NET) for teaching and fellowship for research, conducted by Council for Scientific and Industrial Research, Government of India, 1994.

Awarded Gold Medal in a science exhibition conducted by National Council for Educational Research &Training, India, for making a model for mod ified bullock cart, 1985.

Awarded National Merit Scholarship, 1984

Other Recognitions

A Special Issue on Youth Power of "**INDIA TODAY**", A leading International magazine from India has published and article on "**Youth Guns: The 50 on Fast Track**", has featured me as one of the Young Leaders of tomorrow (January 31, 2005).

According to the article, 50 people upto age 35 featured in the article, are the leaders of a generation marked by drive and dynamism. Their influence is undeniable today and it is everywhere– in politics, business, the arts, science and sports. Identifying the best and the brightest who represent the changing face of India, Dr. Bhardwaj has been identified as "**Scientist-Entrepreneur**" and "**Grid Guru**" for his contributions to PARAM Supercomputer, a Project of C-DAC and Pioneering Grid Computing in India.

Publications

1. **D. Bhardwaj** and M. Sinha, GridFS: Ensuring Massively Parallel I/O for High Performance Clusters, International Workshop on Databases in Networked Information Systems (DNIS 2005), Japan.

2. S. Yerneni, S. Phadke., D. **Bhardwaj,** S. Chakraborty, and R. Rastogi, Imaging subsurface geology with seismic migration on a computing cluster, Current Science, Vol. 88., No. 3, February 2005.

3. **D. Bhardwaj**, "Application I/O on a Parallel File System for Linux Clusters", to appear as a book chapter in "High performance computing: Paradigm and Infrastructure", John Wiley & Sons, Inc, 2005

4. **D. Bhardwaj** and S. Newhouse, "The Grid: The Future of Oil and Gas Exploration Computing", Proceedings of PETROTECH'2005, January 2005.

5. **D. Bhardwaj**, J. Cohen, S. McGough and S. Newhouse "A Componentized Approach to Grid Enabling Seismic Modeling Algorithm, Lecture Notes in Computer Science, Springer Verlag, PP. 94-97, 2004

6. **D. Bhardwaj** and M. Sansi, Relational Model Creation Algorithm for Financial Markets. Proceedings of First World Congress on Lateral Computing, Bangalore, 2004.

7. **D. Bhardwaj**, BioGrid: Challenges, Problems and Opportunities,BIOHORIZON, 2004.

8. S. Phadke, S. Yerneni, S. Chakraborty and D. Bhardwaj, Seismic Numerical Modeling on PARAM Padma , Proceedings of SPG (Society of Petroleum Geophysicists) Fifth conference- 2004.

9. **D. Bhardwaj,** M. Sansi and D. Ajwani**,** Parallel Algorithm for Real Time Decision System for Financial Markets, HiPC'2003.

10. Chakraborty, S., Yerneni, S., Phadke, S. and **Bhardwaj, D**., Parallelization Strategies for Seismic modelling algorithms, J Ind Geophys Union (IGU), vol. 7 (2003), no. 1, pp. 11-14.

11. **D. Bhardwaj**, High Performance Computing in Exploration Geophysics: Changing Dimensions, Oil Asia Journal, Vol. 24 (2 & 3), 2003 and (Proceeding of PETROTECH' 2003, Delhi, India)

12. N. Seetharama Krishna, P. Yadav and **D. Bhardwaj**, The Parallel I/O Architecture for High Performance Computers using Network Centric Storage System, HPC ASIA 2002, India.

13. N. Seetharama Krishna, P. Yadav and **D. Bhardwaj**, A Scalable High Performance Storage System Architecture, 15th International Conference on Parallel and Distributed Computing Systems (PDCS 2002), Louisville, KY USA, pp. 193 – 198.

14. S. Yerneni, **D. Bhardwaj**, S. Chakraborty and S. Phadke, Finite Difference Forward Modeling for Complex Geological Models, **SEG** (Society for Exploration Geophysicists) 72nd Annual International Meeting, Oct 6-11, 2002, Salt Lake City, Utah USA.

15. S**.**K. Dey and **D. Bhardwaj**, Parallelized PFI for large-scale non-linear systems in a distributed computing environment. Applicable Mathematics (Edited by Prof. J.C. Mishra), Nrosa Publications, 2001.

16. **D. Bhardwaj**, Formation of Shock Waves in Magnetogasdynamic Flows, International Journal of Engineering Science Vol. 38 (2000), pp.1197-1206.

17. **D. Bhardwaj**, Problem Solving Environment for wave equation based seismic modelling. Proceedings of IMACS'2000: International Conference on Scientific Computing & Mathematical Modelling, University of Wisconsin at Milwaukee, USA, pp.78 – 87.

18. S. Phadke, **D. Bhardwaj** & S. Yerneni, Marine synthetic seismograms using elastic wave equation. Expanded Abstract, SEG (Society for Exploration Geophysicists) 70th Annual International Meeting, August'2000 Calgary, Canada.

19. **D. Bhardwaj**, S. Phadke & S. Yerneni, On improving performance of migration algorithms using MPI and MPI-IO, Expanded Abstract, SEG (Society for Exploration Geophysicists) 70th Annual International Meeting, August'2000 Calgary, Canada.

20. **D. Bhardwaj**, S. Phadke and S. Yerneni, Efficient Parallel I/O for Seismic Imaging in a Distributed Computing Environment, Proc. of SPG (Society of Petroleum Geophysicists) third conference - 2000, pp. 105 –108.

21. S. Phadke, **D. Bhardwaj** and S. Yerneni, 3D seismic modeling in a Message Passing Environment, Proc. of SPG (Society of Petroleum Geophysicists) third conference- 2000, pp. 168 - 172.

22. S. Phadke, **D. Bhardwaj** and S.K. Dey, An Explicit Predictor-Corrector Solver with Application to Seismic Wave Modelling, Computers & Geosciences, Vol. 26, No. 9-10 (2000), pp. 1053-1058.

23. **D. Bhardwaj** and R. Shankar, A Computational Method for Regularized Long Wave Equation. Computers and Mathematics with Applications, Vol. 40, No. 12 (2000), pp. 1397-1404.

24. **D. Bhardwaj**, T.V. Singh and R. Shankar, Higher Order Solver for Cylindrical Shock Problem. Mathematical and Computer in Modelling, Vol. 32, No.9 (2000), pp. 997-1003.

25. **D. Bhardwaj** and S. Yerneni., Wave Equation Methods in Seismic Data Processing, Lecture notes of refresher course in Geophysics, at Pune University, Pune (India) during December 28, January 18, 1999.

26. **D. Bhardwaj** and R. Upadhyay, Group Theoretic Method for Converging Shock Wave Problem. Applied Mathematics Letters Vol. 12 No.2 (1999), pp. 79-86.

27. **D. Bhardwaj**, Parallel Solver for Hyperbolic System of Equations and its Application to Oil Exploration, Proceedings of an International AMSE conference on Computer Modeling, Simulation and Communication (CMSC-99), Tata McGraw Hill, 1999.

28. S. Yerneni, **D. Bhardwaj** and S. Phadke, Implementation of wave equation based Imaging Techniques on PARAM 10000, The journal of geophysical union, Vol.3, No. 1(1999) pp.45-50.

29. S. Phadke, **D. Bhardwaj** and S. Yerneni., Development of migration and modelling algorithms for imaging crustal structures, Research Highlights Volume in Earth Sciences, Paper no. 15, Published by Department of Science and Technology, Govt. of India, 1999.

30. **D. Bhardwaj**, S. Yerneni and S. Phadke, Parallel Computing in Seismic Data Processing, 1999, Proceedings of PETROTECH-99: 3RD International Petroleum Conference and Exhibition, New Delhi, (1999), pp. 279 - 286.

31. S. Phadke, **D. Bhardwaj** and S. Yerneni, Wave equation based migration and modelling algorithms on parallel computers, Proc. of SPG (Society of Petroleum Geophysicists) second conference (1998), pp. 55 – 59.

32. S. Phadke and **D. Bhardwaj**, Parallel Implementation of Seismic Modeling Algorithms on PARAM OpenFrame. Neural, Parallel and Scientific Computations (Dynamic Publishers, Atlanta (USA)), Vol. 6, No.4, (1998) pp. 469 - 478.

33. R. Shankar and **D. Bhardwaj**, Similarity Solution of Reactive Shock in Magnetogasdynamics. Differential Equations and Dynamical Systems: An international Journal of theory and applications, Vol. 6, No. 1/2(1998), pp. 195-210.

34. **D. Bhardwaj**, S.K. Dey and S. Phadke, A predictor-corrector solver for wave equation based seismic modeling, Special Proceedings of IMACS'98: International conference on Scientific Computing and Mathematical Modeling, Alicante, Spain (featured talk), 1998. pp. 164 – 174.

35. S. Yerneni, **D. Bhardwaj** and S. Phadke, Wave equation based Imaging Techniques, 1998, Proceedings of 35th annual convention and meeting on "Continental Margins of India - Evolution, Processes and Potentials".

36. P.C. Jain, R. Shankar and **D. Bhardwaj**, Numerical Solution of Korteweg -deVries (KdV) Equation, Chaos, Solitons & Fractals, Vol.8, No. 6(1997). pp. 943 - 951.

37. S. Phadke and **D. Bhardwaj**, Depth extrapolation of seismic wavefields using cubic spline approximation, SEG (Society for Exploration Geophysicists) 67th Annual International Meeting, Nov. 2-7, 1997, Dallas Texas, USA.

38. S. Phadke and **D. Bhardwaj**, PVM Implementation of higher order finite difference seismic modelling algorithms in a distributed computing environment, SEG (Society for Exploration Geophysicists) 67th Annual International Meeting, Nov. 2-7, 1997, Dallas Texas, USA.

39. **D. Bhardwaj**, A Computational Method for Solving two dimensional Burgers' Equation, Differential Equations and Dynamical Systems: An international Journal of theory and applications, Vol. 4, No. 3/4(1996), pp. 285-292.

40. R. Shankar and **D. Bhardwaj**, On Reactive shock in magnetogasdynamic flow. Journal of Mathematical Analysis and Applications, Vol. 179, No. 2(1993), pp. 335-348.

Research Papers Communicated

1. **D**. **Bhardwaj** , S. Yerneni, S. Chakraborty and S. Phadke, Parallel Seismic Imaging on Beowulf Clusters, Communicated

2. **D. Bhardwaj** and S. See, Seismic Data Processing on Computational Grid", Communicated.

Project Reports

"Development of Seismic Migration and Modelling Algorithms for Imaging Crustal Structures", Department of Science and Technology, Government of India (1998), pp. 98

"Development of Parallel Seismic Data Processing Algorithms", Department of Science and Technology, Government of India (2002), pp. 100

"Development of Parallel Solvers for Hyperbolic System of Equations and their Applications to Some Industrial Problems", Department of Science and Technology, Government of India (2000)

Others

1. Co-edited "e-scince workshop" section of Hipc'2003 workshop proceedings, 2003

Systems and Software Developments

Developer of Parallel Panther Beowulf Cluster at Eastern Illinois University, Charleston (USA)

Parallel Panther is a NO cost Beowulf class supercomputer. Beowulf is a multi computer architecture, which can be used for parallel computations. It is a system built using commodity hardware components such as PC's connected via Ethernet or some other network. The hardware used in Parallel Panther is the discarded hardware by various labs and faculty members

"*Waves*" Developer

One of the main developers of "**Waves: A Parallel Seismic Migration and Modeling Package"**. This software is available on PARAM series of Parallel Supercomputer and is being utilized for processing of real data sets from Indian Oil companies and research organizations.

Present Research Projects

Prestack Migration and Velocity Analysis, funded by Department of Science & Technology, Ministry of Science & Technology, Govt. of India (2002-2004). With C-DAC, Pune as Co-PI.

Development of Parallel Solvers for Solving Partial Differential Equations and their Industrial Applications, Indian National Science Academy, India (2003 – 2005).

Consultancy Projects

1. SUN Microsystems: Setting up Asia Pacific Science and Technology Facility (APSTF) and executing various projects under the facility.
2. Marketopers Securities Pvt. Limited, New Delhi: Development of Parallel Algorithms for financial Market forecast
4. Madhya Pradesh State Electricity Board: Setting up Data Centre for MP State Electricity Billing facility.
3. Progreesion Infonet, Gurgaon: Development of HPC cluster and HPC solutions

Funded Research Projects Completed

1. Development of Seismic Migration and Modelling Algorithms for Imaging Crustal Structures, funded by Department of Science & Technology, Government of India,(1998) as Co-Principal Investigator.

2. Development of Parallel Seismic Data Processing Algorithms**,** funded by Department of Science & Technology, Government of India,(1999-2001) as Co-Principal Investigator

3. Development of Parallel Solvers for Hyperbolic System of Equations and Their application to some Industrial Problems, Young scientist project award by the Department of Science & Technology, Ministry of Science & Technology, Govt. of India (2000).

4. Development of Parallel Navier Stokes' Solvers, funded by Naval Research Board, Ministry of Defence, Government of India (1999-2000), as Principal Investigator.

5. Development of Parallel Computing Environment and Scientific Applications, funded by Eastern Illinois University, Charleston, IL (USA), (2000-2001) as Principal Investigator.

Commercial Projects Completed

One-pass frequency-space poststack seismic depth migration of full 3D volume of KKDWA data from ONGC. 1998.

Design and Development of a parallel computer **System One,** for Progression Pvt. Ltd. Gurgaon, 2003.

"Parallel Algorithm for Financial Market Forecast", for Marketopper's Securities Pvt. Ltd. Delhi, 2004.

BIOBOX: Cluster Grid Biocomputing toolkit, for SUN Microsystems, 2005.

Tutorials & Workshops

A short course of HPC, Computer Service Center, Indian Institute of Technology, Delhi, India, May, 2003

Tutorial on "Designing Cluster Computers and High Performance Storage Systems, HPC-ASIA – 2002 (with Mr. N. Seetharamakrishna)

Tutorial on "Writing Parallel Scientific Applications on Linux Clusters", at a conference on Recent Developments in Parallel Computing for Science & Technology, held at Eastern Illinois University, Charleston USA 2000.

A workshop on Parallel Computing and Hands-on on PARAM-10000, Computer Service Center, Indian Institute of Technology, Delhi India , Aug'2002.

Organizing Chair, Workshop on e-science, in Conjuncture with HiPC' 2003, Hyderabad, India.

Organizing Chair, INDO-UK workshop on e-science, IIT Delhi, 2004

Organizing Chair, A Quality Improvement Program for Engineering College faculties on" e-Science", Indian Institute of Technology Delhi, India, November 2004.

Invited Lectures

On "**Parallel implementation of Seismic Modelling Algorithms on PARAM OpenFrame**" Department of Physics, Eastern Illinois University, Charleston, USA, October 16, 1997.

On "**Waves in Oil Exploration Industry**", Department of Mathematics, Eastern Illinois University, Charleston, USA, October 17, 1997.

Featured talk on "A predictor-Corrector solver for wave equation based seismic modelling" at IMACS'98: International Conference on **Scientific Computing and Mathematical Modellin**g, Spain, June 1998.

Headed a panel discussion on "Distance Learning in Science and Technology" at Alicante, Spain, June 1998.

Featured talk on "**High Performance Computing in Oil Exploration Industry**" at an International Conference on Scientific Computing, held at S.N. Bose Institute, Calcutta (India), July 9-11, 1998.

Chaired a panel discussion on "Virtual University " at Calcutta, India, on July 11, 1998.

Invited lectures under **Scientific Computing** co-operation activity by the invitation of Istituto Per Applicazioni Della Matematica, Napoli (Italy) for the period June 28, 1998 to July 6, 1998.

Invited talk on "**Use of Parallel Computers in Oil Exploration**", at ADCOMP'98: 6th International **Conference on Advanced Computing**, Pune (India), During December 14-16, 1998

Invited talk on "**Parallel Computing in Seismic Data Processing**", at PCAA-99: Workshop on **Parallel Computing: Algorithms and Applications**, C-DAC, Pune (India), June 21– 25, 1999.

Invited talk on "**Direct Numerical Simulation of Incompressible Flow**", at University of Rome "LA SEPINZA", Rome, Italy, Sept 16, 1999.

Featured Speaker at IMACS'2000: International Conference on **Scientific Computing and Mathematical** Modelling, University of Wisconsin at Milwaukee, USA, May 25-27, 2000.

Featured talk on "**Parallel Scientific Applications on Clusters**", at a conference on Recent Developments in **Parallel Computing for Science & Technology**, held at Eastern Illinois University, Charleston USA during October 20-22, 2000.

Invited talk on "**Solving PDEs for Some Real Problems on Parallel Computers**", **at NASA-Ames** Research Center, California (USA**) under new technology seminar series,** August 2, 2001**.**

Banquet talk on **"The GRID",** at a workshop on Parallel Computing and Optimisation of Parallel Programs, C-DAC, Pune (India), June, 2002.

Invited talk on "**BioGrid: Challenges, Problems and Opportunities**", at conference on Genome Informatics: 10th FAOBMB Congress, December 2003.

Invited talk on **"Grid: Challenges, Problems and Opportunities",** at **EUROINDIA'2004**, New Delhi, (India), March 2004.

Invited talk on **"Computational Grid: Building Bridges for Future of Science",** at ELITEX'2004, New Delhi (India), April 2004.

Invited talk on **"e-Science: Computational Grid Infrastructure & Scientific Applications",** at Annual Convention of Computer Society of India, Mumbai, December 2004.

Chaired a Panel Discussion on "**Harnessing Grid in India**", at Annual Convention of Computer Society of India, Mumbai, December 2004.

Program Committee Member (International Conference)

Program Committee Member in several International conferences in the area of Grid and High Performance Computing.

Personal Details

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Date of Birth	:	September 29, 1969
Nationality	:	Indian
Marital Status	:	Married

References

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