Final Report on Dissemination

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Deliverable: D3.1b
Date: March 1998
Status: draft
Confidentiality: public
Responsible: N.A. Software Ltd

Revised:

The **HPF+** Consortium:
AVL GesmbH - Austria
European Centre for Medium-Range Weather Forecasts (ECMWF) - England
Engineering System International SA (ESI) - France
NA Software Ltd (NAS) - England
University of Pavia - Italy
University of Vienna - Austria

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1 Introduction

This Deliverable provides a brief report on dissemination activities carried out during the HPF+ project; it represents an update of Deliverable D3.1a. The activities include:

Preparation of Conference and Journal Papers : Because of the research orientation of the project, this aspect of the dissemination has dominated;

Presentation of Lectures : at Workshops and Seminars;

Standards Activities : via attendance at HPFF meetings and the provision of input to the HPF2 design process;

International Workshop : A first workshop was held in January 1997; a second has been organised for April 1998 during HPCN in Amsterdam.

2 Papers Presented or Submitted

1. L.M. Delves and D. Watson, *Generalised Reduction Facilities for HPF*, paper presented at the Euromicro Workshop, January 23rd 1997
2. Andel,S., Di Martino,B., Hulman,I., Zima,H.P.: Program Comprehension Support for Knowledge Based Parallelization
   Proc. 4^{th} *EUROMICRO Workshop on Parallel and Distributed Processing*, Braga, Portugal (January 1996)
3. Chapman,B.M.,Mehrotra,P.,Zima,H.P.: High Performance Applications: State-of-the-Art and Future Requirements
   1996 Spring Proceedings, Cray User Group, pp.6-13 (March 1996)
4. Mehrotra,P., and Zima,H.P.: Extending High Performance Fortran for Advanced Applications
   Proc.Sommerschule Partielle Differentialgleichungen, Numerik und Anwendungen, KFA Jülich (September 1996)
5. Benkner,S.,Mehrotra,P.,Van Rosendale,J.,Zima,H.P.: Current State and Future Developments of HPF-Like Languages
   Proc. Seventh ECMWF Workshop on Parallel Computers in Meteorology, Reading, England (December 1996)
6. Chapman,B.M.,Mehrotra,P.,Zima,H.P.: HPF+: New Language and Implementation Mechanisms for the Support of Advanced Irregular Applications
   Proc. Sixth Workshop on Compilers for Parallel Computers (CPC'96), Aachen, Germany (December 12, 1996)
7. Mehofer,E.,and Zima,H.P.: Distribution Assignment Placement Based on Bidirectional Data Flow Frameworks

Technical Report TR 96-, Institute for Software Technology and Parallel Systems, University of Vienna (December 1996)

8. S. Benkner, et.al. Vienna Fortran Compilation System. Version 1.2. User's Guide, TR, Univ. of Vienna, Inst. f. Software Technology and Parallel Systems, February 1996.

9. Chapman,B.M.,Zima,H.P.,Haines,M.,Mehrotra,P.,Van Rosendale,J.: OPUS: A Coordination Language for Multidisciplinary Applications
Scientific Programming (1997)

10. Chapman,B.M.,Mehrotra,P.,Zima,H.P.: Vienna Fortran and the Path Towards a Standard Parallel Language
Invited paper, IEICE Trans.Information and Systems,Vol.E80-D,No.4 (April 1997)

11. S. Benkner. HPF+: High Performance Fortran for Advanced Industrial Applications. Proceedings HPCN'98, Amsterdam, April 1998, Springer Verlag (to appear).

12. S. Benkner, K. Sanjari, V. Sipkova, and B. Velkov. Parallelizing Irregular Applications with the Vienna HPF+ Compiler VFC.
Proceedings HPCN'98, Amsterdam, April 1998, Springer Verlag (to appear).

13. S. Benkner, P. Mehrotra, J. Van Rosendale, and H. Zima. High-Level Management of Communication Schedules in HPF-Like Languages.
NASA Contractor Report 201740, ICASE, Hampton, VA, September 1997.

14. S. Benkner and M. Pantano. "HPF+ Optimizing HPF for Advanced Applications", Supercomputer Journal, Vol.13, No.2, pages 31-43, 1997.

15. Mahéo, Y. and Massari, L., Performance Evaluation of Automatically Generated Data Parallel Programs, Proc. 4th EuroMicro Workshop on Parallel and Distributed Processing, pp534–540, 1966

16. Calzarossa, M. and Massari, L. and Merlo, A. and Tessera, D., Parallel Performance Evaluation: the MEDEA Tool, Proc. HPCN Europe '96, Springer–Verlag, LNCS 1067, editors Liddell, H. and Colbrook, A. and Hertzberger, B. and Sloot, P., pp522–529, 1996

17. Merlo, A., Performance Evaluation of HPCN Applications, Proc. HPCN Europe '97, Springer–Verlag, LNCS 1225, editors Hertzberger, B. and Sloot, P., pp1008-1009, 1997

18. Calzarossa, M. and Massari, L. and Merlo, A. and Pantano, M. and Tessera, D., Integration of a compilation system and a performance tool: the HPF+ approach, HPF+ Workshop at HPCN98 Conf., 1998, accepted for publication

19. Calzarossa, M. and Massari, L. and Merlo, A., Performance Issues of an HPF–like compiler, Future Generation Computer Systems, Special Issue on Performance Data-Mining in Parallel and Distributed Computing, 1998, accepted for publication

20. Calzarossa, M. and Massari, L. and Merlo", Performance Analysis of HPF+ Kernels, 1998, submitted for publication

21. Andel,S., Di Martino,B., Hulman,I., Zima,H.P.: Program Comprehension Support for Knowledge Based Parallelization
Proc. 4^{th} *EUROMICRO Workshop on Parallel and Distributed Processing*, Braga, Portugal (January 1996)

22. Chapman,B.M.,Mehrotra,P.,Zima,H.P.: High Performance Applications: State-of-the-Art and Future Requirements
1996 Spring Proceedings, Cray User Group, pp.6-13 (March 1996)

23. Mehrotra,P., and Zima,H.P.: Extending High Performance Fortran for Advanced Applications
Proc.Sommerschule Partielle Differentialgleichungen, Numerik und Anwendungen, KFA Jülich (September 1996)

24. Zima,H.P.: High Performance Languages for Parallel Computing
IEEE Computational Science and Engineering,Vol.3,No.3,pp.63-65 (Fall 1996)

25. Benkner,S.,Mehrotra,P.,Van Rosendale,J.,Zima,H.P.: Current State and Future Developments of HPF-Like Languages
Proc. Seventh ECMWF Workshop on Parallel Computers in Meteorology, Reading, England (December 1996)

26. Chapman,B.M.,Mehrotra,P.,Zima,H.P.: HPF+: New Language and Implementation Mechanisms for the Support of Advanced Irregular Applications
Proc. Sixth Workshop on Compilers for Parallel Computers (CPC'96), Aachen, Germany (December 12, 1996)

27. Mehofer,E.,and Zima,H.P.: Distribution Assignment Placement
Technical Report TR 96-5, Institute for Software Technology and Parallel Systems, University of Vienna (December 1996)

28. Chapman,B.M.,Zima,H.P.,Haines,M.,Mehrotra,P.,Van Rosendale,J.: OPUS: A Coordination Language for Multidisciplinary Applications
Scientific Programming (in print)

29. Chapman,B.M.,Mehrotra,P.,Zima,H.P.: Vienna Fortran and the Path Towards a Standard Parallel Language
Invited paper, IEICE Trans.Information and Systems,Vol.E80-D,No.4, pp.409-416 (April 1997)

30. Di Martino,B.,Iannello,G.,Zima,H.P.: An Automated Algorithmic Recognition Technique to Support Parallel Software
Proc. 2nd International Workshop on Software Engineering for Parallel and Distributed Systems, Boston, Massachusetts (May 17-18, 1997)

31. Ujaldon,M., Zapata,E.L., Chapman,B.M., Zima,H.P.: Vienna Fortran/HPF Extensions for Sparse and Irregular Problems and Their Compilation
IEEE Transactions on Parallel and Distributed Systems, Vol.8, No.10, pp.1068-1083 (October 1997)

32. Mehrotra,P.,Van Rosendale,J.,Zima,H.P: Solving Irregular Problems With High Performance Fortran
Proc.3rd Working Conference on Massively Parallel Programming Models (MPPM-97), London, November 1997 (to appear)

33. Mehrotra,P.,Van Rosendale,J.,Zima,H.P: High Performance Fortran: History, Status and Future
Parallel Computing, February 1998 (in print)

34. Mehrotra,P.,Van Rosendale,J.,Zima,H.P: Language Support for Multidisciplinary Applications
IEEE Computational Science and Engineering (in print)

35. G. Lonsdale, J Clinckemaillie, S. Meliciani, S. Vlachoutsis and B. Elsner, Parallel and distributed crashworthiness simulation, Proceedings of the 1996 CERN School of Computing, Egmond aan Zee, The Netherlands, Sept. 1996, CERN Technical Report 96-08, 1996

36. G. Lonsdale, F. Zimmermann, J. Clinckemaillie, S. Meliciani and S. Vlachoutsis, Parallel programming paradigms for crashworthiness simulation, Proceedings of the EURO-CM-Par97 Conference, April 26th - May 1st, Lochinver, Scotland, Saxe-Coburg Publications, 1997/8

37. G. Lonsdale, F. Zimmermann, J. Clinckemaillie, S. Meliciani, HPF+ investigations with crash-simulation kernels, in "Programming Models for Massively Parallel Computers (MPPM'97)", IEEE conference publication (to appear) 1998.

38. G. Lonsdale, A. Petitet, F. Zimmermann, J. Clinckemaillie, S. Meliciani and S. Vlachoutsis, Programming crashworthiness simulation for parallel platforms, Special Issue of Mathematical and Computer Modelling, submitted 1998

39. G. Lonsdale, A. Petitet, F. Zimmermann, J. Clinckemaillie, S. Meliciani, Contact-impact kernels in HPF+, NEC Research Journal, to appear 1998

3 Lectures Presented

1. G. Lonsdale, *Crash Simulation: A Challenge for HPF*, presented at the Industrial End User Session, HPCN 96, Brussels, April 96.

   Included an introduction to the PAM-CRASH algorithms and structures, the consequences for HPF and HPF+ implementations, and an overview of the HPF+ project.

2. G. Lonsdale, *Aims and Objectives of the HPF+ Project*, presentation at NEC Corporation C&C Research Laboratories, Kawasaki, Japan, May 31st 1996.

3. G. Lonsdale, *HPF+ Kernels and Requirements*, presented at the **Summer of HPF** workshop, Vienna, 3-4 July 1996.

4. G. Lonsdale, *Parallelization Requirements for Crash-simulation on HPC Platforms*, presented at the GMD-NEC Workshop, Skt Augustin, 17-18 September 1996.

5. G. Lonsdale and G. Mozdzynski, *HPF+*, presentation at the tenth RAPS Workshop (part of the seventh ECMWF Workshop on *The Use of Parallel Processors in Meteorology*, Reading, 4th December 1996.

6. OPUS: Abstractions for High Performance Distributed Computing
   Invited Lecture
   Workshop on Languages and Models for Future Computing Systems, University of Vienna (January 23, 1996)

7. Mozdzynsky, G: HPF/HPF+
   Presentation at ECMWF, Reading, November 28 1997

8. Lonsdale, G: Progress in the HPF+ Project
   Internal presentation to NEC Central Research Laboratory, Kawasaki Japan, July 1997

9. Calzarossa, M.: Performance Issues of an HPF-like compiler Invited presentation on Medea at "Performance Data Mining Workshop", ICS '97, Vienna, July 7 - 11 1997

10. Calzarossa, M.: Seminar on "Performance Analysis of HPF+ Kernels" UC Berkeley, CA, USA, November 18th 1997

11. H. Zima: The HPF+ Project
    Presentation at NASA Ames, November 24th 1997

12. S. Benkner. "HPF+: The Language and its Implementation",
    Presentation at NEC Corporation, C&C Research Labs, Kawasaki, Japan, July 24, 1997.

13. S. Benkner. " The Vienna HPF+ Compiler VFC",
    Presentation at NASA AMES Research Center, Moffet Field, CA, USA, November 24, 1997.

14. S. Benkner: A presentation of VFC was given
    HPCN'97 Exhibition in Vienna.

15. H. Zima: OPUS: Abstractions for High Performance Distributed Computing
    Invited Lecture
    Workshop on Languages and Models for Future Computing Systems, University of Vienna, Austria (January 23, 1996)

16. H. Zima: Vienna Fortran – Eine Sprache für die Programmierung von massiv parallelen Hochleistungsrechnern
    GMD FIRST Colloquium, Berlin, Germany (January 29, 1996)

17. H. Zima: High Performance Applications – State of the Art and Future Requirements
    Spring'96 Cray User Group Conference, Barcelona, Spain (March 14, 1996)

18. H. Zima: HPF+
    Dagstuhl Seminar on Loop Parallelization, Dagstuhl, Germany (April 17, 1996)

19. H. Zima: High Performance Languages for Parallel Scientific Computation
    Colloquium, School of Mathematics and Physics, University of Bratislava, Bratislava, Slovakia (June 18, 1996)

20. H. Zima: Extending High Performance Fortran for Advanced Applications
    Sommerschule über Partielle Differentialgleichungen, Numerik und Anwendungen
    KFA Jülich, Germany (September 3, 1996)

21. H. Zima: High-Level Languages for Parallel Scientific Computation
    Scuola per il Dottorato di Ricerca, GII – Grupo Ingegneria Informatica
    University of Pavia, Italy (September 10, 1996)

22. H. Zima: High-Level Programming Support for Scalable Parallel Systems
    Parallel Numerics'96, Gozd Martuljek, Slovenia (September 11, 1996)

23. H. Zima: Current State and Future Developments of HPF-Like Languages
    Seventh ECMWF Workshop: Use of Parallel Computers in Meteorology, Reading, England (December 5, 1996)

24. H. Zima: HPF+: New Language and Implementation Mechanisms for the Support of Advanced Irregular Applications
    Sixth Workshop on Compilers for Parallel Computers (CPC'96), Aachen, Germany (December 12, 1996)

25. H. Zima: Language Extensions for Irregular Scientific Computation
    Computer Science Seminar, Old Dominion University (ODU), Norfolk, Virginia (February 12, 1997)

26. H. Zima and B. Chapman: High-Level Languages, Compilers and Tools for Parallel Scientific Computation
    Cursos CIRIT, Universitat Politecnica de Catalunya, Barcelona, Spain (March 6–7, 1997)

27. H. Zima: High Performance Languages for Parallel Scientific Computation
    Computer Science Seminar, La Laguna University, Teneriffa, Spain (March 10, 1997)

28. H. Zima: Programmiersprachen für skalierbare Hochleistungsrechner
    Fakultätskolloquium, Albert-Ludwigs-Universität Freiburg, Freiburg im Breisgau, Germany (June 4, 1997)

29. H. Zima: Solving Irregular Problems With High Performance Fortran
3^{rd} Working Conference on Massively Parallel Programming Models (MPPM-97), London (November 12, 1997)

30. H. Zima: High-Performance Languages for Parallel Scientific Computation
NASA Computer Science Seminar, NASA Ames Research Center, Moffett Field, California, USA (November 24, 1997)

31. F. Zimmermann, HPF+ PAM-CRASH Kernels - First Comparisons, HPF User's Conference, Santa Fe, Feb. 1997

32. G.Lonsdale, Progress in the HPF+ Project, presentation at NEC Corporation C&C Research Laboratories, Kawasaki, Japan, July 1997

4 Conferences and Workshops Attended

Partners have participated in the following technical conferences, workshops and meetings:

Event	Participating Partner
EUROMICRO 24-26/1/96, Braga	U. Pavia
NEC CRL Japan	NEC-CCRLE
HPCN Europe 15-19/4/96, Brussels	Univ. Vienna U. of Pavia NEC
Summer of HPF,3-4/7/96, Vienna	U. of Vienna NEC-CCRLE
HPFF 12-14/7/96, S. Francisco	U. of Vienna
SC'96, Pittsburgh	U. of Vienna
CPC'96, Aachen	U. of Vienna
GMD-NEC Workshop, 17-18/9/96, St. Augustin	NEC-CCRLE
7th ECMWF Workshop, 2-6/12/96, Reading	ECMWF NEC-CCRLE U. of Vienna
SC97, November 15-21 1997, San Jose	Univ. Vienna NASL NEC-CCRLE U Pavia
First HPF User's Group Meeting, Santa Fe, NM, USA, February 24-26, 199	VCPC NEC-CCRLE
IPPS Symposium 1997, Geneva, 1-5/4/97	U. Pavia
HPCN Europe 1997, Vienna, 28-30/4/97	U. Pavia VCPC U. Vienna
ICS'97, Vienna	U. Vienna
MMP97, London, Nov 97	U. Vienna NEC-CCRLE

The attendance at SC97 involved a major project effort; the project was represented by a stand in the exhibition, and manning was shared by those present. Attendance at the stand was reasonably encouraging.

Organisation was by the University of Vienna.

5 Standards Meetings: HPFF

The project has been well represented at the HPFF (HPF Forum) meetings held during 1996 to design the HPF2 upgrade to HPF. This attendance has provided the opportunity to make the HPF+ project, and the HPF+ language effort, known within the core HPF design community. Perhaps more importantly in the long term, it has allowed significant input from HPF+ into the HPF2 design exercise. This input has had directly visible effects; for example, the `GEN_BLOCK` and `INDIRECT` distributions in HPF2 stem directly from Vienna proposals as in the HPF+ language.

HPFF Meetings attended include:

1. March 13-15 1996, Arlington, Texas: VCPC
2. May 1-3 1996, Arlington, Texas: VCPC
3. July 17-19 1996, Chicago: VCPC
4. September 18-20 1996, San Francisco: NAS
5. November 19 1996, Pittsburgh: Univ. Vienna
6. December 9-11 1996, Houston: NAS

6 HPF+ Workshops

As a major dissemination activity, the project organised a one day International Workshop on HPF+, held at Reading, January 21st 1997. This workshop included several talks from HPF+ partners, together with invited talks from other active HPF research workers and users. It's major aim was to present the HPF+ project work in the context of the use of HPF for real problems. Approximately fifty delegates attended, and we were well pleased.

A second workshop has been organised during HPCN 98, in Amsterdam, April 23rd 1998 (just before the final Review). A similar format is being used, and we are very confident that the HPF+ results will attract considerable interest.

7 Web Pages

The project maintains a substantial WWW presence, on:

`http://www.par.univie.ac.at/hpf+`

It is also documented in the NASL web pages at:

`http://www.nasoftware.co.uk`