數位訊號處理實體應用系統產生器的設計與實作

蔣志雄、黃其泮

E-mail: 9223469@mail.dyu.edu.tw

摘 要

傳統數位訊號處理應用系統其設計與實作的過程是相當複雜而且需要耗費相當多的人力與時間。因此，如何簡化應用系統設計與實作的複雜度成為一個相當重要的研究課題。我們提出一個智慧型的整合型發展環境，它以軟硬體共設計方法為建構基礎，並且結合了現今的計算機輔助設計工具與大型可程式化元件，其目的在於縮短概念系統到實體系統間的發展差距。 整合型發展環境整合了ASIC、FPGA、DSP、RISC等硬體單元，以建立一個高運作效能之可植入式硬體平台，配合整合型發展環境的硬體編譯環境，進行由概念系統到特定化硬體架構契合的一連串轉譯工作，進一步地使整合型發展環境能以傳統計算機使用的簡便性，以及硬體運作效能的優勢來完成各項計算工作。 本文所提出的整合型發展環境是以黑板系統為架構基礎，用以達成將數位訊號處理應用系統由概念層到實體層的所有轉譯知識整合在同一運作機制下應用，以最適當的抽象層級來互動，並且強化知識的適用性來提升知識系統的推論效能，使知識系統能實用化並發揮其優勢。我們並將它設定為開放式整合發展系統架構的基礎，達成了整合數位訊號處理應用系統設計、驗證與強化快速計算等研究目標。

關鍵詞 : 整合型發展環境 ; 軟硬體共設計 ; 黑板系統

目錄

參考文獻

[1] J. C. Ferreira and J. S. Matos, “ A Prototype System for Rapid Application Development Using Dynamically Reconfigurable Hardware, ” Proceedings. IEEE Symposium on FPGAs for Custom Computing Machines, pp. 280-281, 1998.

[2] A. Y. Wu, K. J. Liu, and A. Raghupathy, “ System Architecture of an Adaptive reconfigurable DSP Computing Engine, ” IEEE Trans. On Circuits and systems for Video Technology, vol. 8, no. 1, pp. 54-73, Feb. 1998.

[3] T. Yamauchi, S. Nakaya, and N. Kajihara, “ SOP: A Reconfigurable Massively Parallel System and Its Control- Data-Flow Based Compiling Method, ” Proceedings of IEEE Symposium on FPGAs for Custom Computing Machines, pp. 148- 156, 1996.

[4] E. Waingold, M. Taylor, D. Srikrishna, V. Sarkar, W. Lee, V. Lee, J. Kim, M. Frank, P. Finch, R. Barus, J. Babb, S. Amarasinghe, and A. Agarwal, “ Baring It All to Software: Raw Machines, ” IEEE Computer, vol. 30, no. 9, pp.86-93, Sept. 1997.

[5] C. R. Rupp, M. Landguth, T. Garverick, E. Gomersall, H. Holt, J. M. Arnold, M. Gokhale, K. L. Pocek and J. M. Arnold, “ The NAPA Adaptive Processing Architecture, ” Proceedings of IEEE Symposium on FPGAs for Custom Computing Machines, pp. 28-37, 1998.

[6] V. K. Madisetti and T. W. Egolf, “ Virtual Prototyping of Embedded Microcontroller-Based DSP Systems, ” IEEE Micro, vol. 15 no. 5, Oct. 1995, pp. 9 —21.

[7] P. Banerjee, N. Shenoy, A. Choudhary, S. Hauck, C. Bachmann, M. Haldar, P. Joisha, A. Jones, A. Kanhare, A. Nayak, S. Periyacheri, M. Walkden, and D. Zaretsky, “ A MATLAB Compiler for Distributed, Heterogeneous, Reconfigurable Computing Systems, ” Proceedings of the 2000 IEEE Symposium on Field-Programmable Custom Computing Machines, pp. 39—48.

[8] Garbergs B. and Sohlberg B., “ Specialised hardware for state space control of a dynamic process, ” TENCON "96. Proceedings. 1996 IEEE

TENCON. Digital Signal Processing Applications, Volume: 2, 26-29 Nov 1996, pp.895 —899.
[9] Cucinotta F., Lavagno L., Reynari L. M., Serra A., “ A hardware/software co-design flow and IP library based of SimulinkTM, ” Design Automation Conference, 2001, Proceedings, 2001, pp.593 —598.
[10] Molson P., “ Accelerating intellectual property design flow using Simulink Lt for system on a programmable chip, ” Signals, Systems and Computers, 2001. Conference Record of the Thirty-Fifth Asilomar Conference on , Volume: 1 , 2001, pp. 454 -457 vol.1.
[11] Garbergs B. and Sohlberg B., “ Implementation of a state space controller in a FPGA. ” Electrotechnical Conference, 1998. MELECON 98., 9th Mediterranean , Volume: 1 , 18-20 May 1998, pp. 566 -569 vol.1 [12] Ho K., Shiu S.C.K., Tsang E.C.C., Wang X.Z., “ Case-base reduction using learned local feature weights, ” IFSA World Congress and 20th NAFIPS International Conference, 2001. Joint 9th , 25-28 July 2001, pp. 2965 -2970 vol.5.
[13] Dang Huu Hung, Drake J.T., Nguyen Hoang Phuong, Prasad N.R., “ Approach to combining case based reasoning with rule based reasoning for lung disease diagnosis, ” IFSA World Congress and 20th NAFIPS International Conference, 2001. Joint 9th , Volume: 2 , 25-28 July 2001, pp. 883 - 888 vol.2.
[14] Chi R.T., Kiang M.Y., Whinston A.B., “ Case based reasoning to model building, ” System Sciences, 1993, Proceeding of the Twenty-Sixth Hawaii International Conference on , Volume: iii , 5-8 Jan 1993, pp. 324 -332 vol.3.
[15] Ando S., Yamazaki K., “ A case-based parallel programming system, ” Software Engineering for Parallel and Distributed Systems, 1998. Proceedings. International Symposium on, 20-21 Apr 1998, pp. 238 —245.
[16] Cheng-Seen Ho, “ Development of a meta-blackboard shell, ” Tools for Artificial Intelligence, 1990, Proceedings of the 2nd International IEEE Conference on , 6-9 Nov 1990, pp. 544 —550.
[17] Hou P. K., Lin L. J. and Shi X. Z., “ Generic blackboard based architecture for data fusion, ” Industrial Electronics Society, 2000. IECON 2000, 26th Annual Confjerence of the IEEE , Volume: 2 , 2000, pp. 864 -869 vol.2.
[18] Stetter F. and Weiss M., “ A hierarchical blackboard architecture for distributed AI systems, ” Software Engineering and Knowledge Engineering, 1992, Proceedings, Fourth International Conference on , 15-20 Jun 1992, pp.349 —355.
[19] Davis G.C., Jie Cheng, Nanxin Wang, Staley S.M., “ Rapid integration of CAE analysis programs using a blackboard approach, ” Artificial Intelligence for Applications, 1994., Proceedings of the Tenth Conference on , 1-4 Mar 1994, pp. 495 —496.
[20] Naaman M., Zaks A., “ Fractal blackboard framework, ” Computer Systems and Software Engineering, 1997., Proceedings of the Eighth Israeli Conference on , 18-19 Jun 1997, pp. 23 —29.
[21] Blackboard Technology Group, Inc. “ GBB Reference, ” Version 2.1, 1992.
[22] Michael Schumacher, “ Objective Coordination in Multi- Agent System Engineering Design and Implementation, ” Springer, 2001.
[24] Janet Kolodner, “ Case-Based Reanoning, ” Morgan Kaufmann Publisher, Inc. 1993.
[25] Mario Lenz, Brigitte Bartsch-Sporl, Hans Burkhard and Stefan Wess, “ Case-Based Reasoning Technology From Foundations to Applications, ” Springer, 1998.
[23] Borland, “ Borland C++ Builder 6 Developer's Guide, ” 2001.
[26] The Mathworks, 2002. See http://www.mathworks.com./ [27] The Xilinx, 2002. See http://www.xilinx.com/ [28] 黃其泮, 劉仁俊, 陳木松, ” 數位式波束形成器之調適型計算系 統, ” 1999年海峽兩岸無線通訊研討會, pp.372-377, Oct. 18-19, 1999.
[29] 黃其泮, ” 以黑板系統為基礎的軟體無線電開放式系統架構, ” 第 五屆人工智慧與應用研討會, pp.722-727, Nov. 17, 2000.
[30] 黃其泮, 蔣志雄, “ 數位訊號處理實體應用系統產生器的設計與實 作, ” 2001年兩岸三地無線科技研討會, pp.138-142, Nov. 30~Dec. 3, 2001.