

1. RESUME - James S. Welch, Jr.

For 50 years Mr. Welch has worked as a designer and implementer of large (and small) computer software applications with emphasis on relational database management and Math Programming applications. Mr. Welch has developed commercial software, developed application systems, and integrated his own commercial software with third party products. Mr. Welch has considerable experience in maintaining and servicing computer programs, authored by others, on behalf of a large user community. He has had success in porting computer programs across hardware lines and across languages.

2. RECENT EXPERIENCE

2.1. CCARS for Fairfax County

Since 2003, in response to Fairfax County's requirements for automating the CCARS registration and invoice generation, Mr. Welch designed the architecture and implemented the CCARS automated enrollment adjustment system. The system computes billing adjustment for enrollment changes, computes, and writes a file containing the monthly invoices that are mailed to parents with children in Fairfax County's Before School and After School Child Care Programs. A significant feature of CCARS is its 99% accuracy rate in a complex situation involving multiple, state and local, tuition subsidy programs.

The CCARS invoice is a one-step process that requires less than two minutes to generate 10,000-plus bills. The CCARS invoice provides significantly more information in a more readable format than did its predecessor.

2.2. Java Application Development

Since 1998 10 years of developing Java applications:

- The HUD Comprehensive Services and Monitoring System, a client/server architecture that provides a PC Windows user interface to a legacy application running on a server.
- A graphical user interface for MathPro 2000, an environment for formulating and debugging large math programming models.

2.3. Web Site Development

10 years of developing sites for the World Wide Web using HTML, JavaScript, Perl, c language and FORTRAN.. The larger of these is the Optimal Retirement Planner (<http://www.i-orp.com>). The ORP site is a retirement calculator the collects financial data from the user, runs a linear programming model (on a computer networked to the web server), and displays an optimal tailored retirement plan. A significant OPR feature is it modeling of the progressive income tax.

2.4. Oracle Database Management

Since 1989, 18 years of developing database management applications:

- HUD mortgage notes management system, including accounting, billing, and management reporting.
- HUD multi family property management system, including accounting, tenant management, and management reporting.

- HUD single family property management system, including accounting and management reporting.
- NASA archive of Hubble Space Telescope on board computer memory images providing for compressed storage of the images, retrieval, and image comparison.
- Critical care nursing staffing system for a provider of contract nurses to hospital critical care units.

Work included database design, application implementation using SQLplus as a formal reporting language as well as c language and Pro C.

2.5. Mathematical Programming Systems

Since 1968, 20 years of developing computer software for math programming linear optimization systems. Designed and implemented interactive user interfaces, compilers for matrix generators, report generators, and optimization algorithms. Provided user support for these systems including model formulation, implementing data processing programs for systems with an embedded math programming component. Maintained math programming systems, including interfacing with the user community, fixing bugs, and implementing enhancements.

2.6. Oxford University, Oxford, UK – Babbage Computing Engine; 1746

Charles Babbage was the first to attempt the construction of a computational device to solve complex mathematical problems. His devices require some sort of programmer interface.

Mr. Welch served as spiritual and technical adviser to Ada Byron as she devised early programming techniques for Charles Babbage's Computing Engine. Unfortunately, the project was put on hold until Thomas Edison commercialized the use of electricity.

3. EDUCATION

BA in Mathematics, Economics Minor, Antioch College, 1958

Graduate Studies in Mathematics, University of Maryland, College Park, 1960.

Graduate Studies in Computer Science, The Johns Hopkins University, 1971-1972.

Graduate Studies in Quantitative Management Science, University of Houston, 1973-1974.

4. PUBLICATIONS

MIPIII - A SLEUTH Based Mixed Integer Program System, presented at SHARE 57, Chicago, Ill., Aug. 1981 (Co-author Dr. John A. Tomlin)

A Pathological Case In the Reduction of Linear Programs, Operations Research Letters, Elsevier Science Publishers, Vol 2, No. 2, June 1983 (Co-author Dr. John A. Tomlin).

Formal Optimization of Some Reduced Linear Programming Problems, *Mathematical Programming*, North Holland, No. 27, 1983 (Co-author Dr. John A. Tomlin)

Integration of a Primal Simplex Network Algorithm with a Large-Scale Mathematical Programming System, ACM Transactions on Mathematical Software, Vol. 11, No. 1, March 1985 (Co-author Dr. John A. Tomlin).

Finding Duplicate Rows in a Linear Programming Model, presented at the Twelfth International Symposium on Mathematical Programming, Boston, Mass., July 1985 Also appeared in *Operations Research Letters*, Elsevier Science Publishers, Vol. 5, No. 1, June 1986 (Co-author Dr. John A. Tomlin).

PAM—A Practitioner's Approach to Modeling, *Management Science*, The Institute of Management Sciences, Vol. 33, No. 5, May 1985.

The Data Management Needs of Mathematical Programming Applications, *IMA Journal of Mathematics in Management*, Oxford University Press, Vol. 1, pages 237-250, 1987.

MATHEMATICAL PROGRAMMING SYSTEMS - IBM Research Report RJ 7400 (69202) Mathematics, 1990. (Co-author Dr. John A. Tomlin). In 1992 appeared as Chapter 11 of *Handbooks in OR & MS*, Vol. 3, E.G. Coffman editor, Elsevier Science Publishers B.V.

Optimal Retirement Planner, linear programming based retirement planner available at <http://www.i-orp.com>

Mitigating the Impact of Personal Income Taxes on Retirement Savings Distributions, *Journal of Personal Finance*, Volume 14, Issue 1, page 17-27, April 2015

A Quantitative Evaluation of Four Retirement Spend Models, *Journal of Personal Finance*, Volume 14, Issue 2, page 43-57, September 2015

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