Joseph P. G. Mack, Ph.D.

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Summary of Qualifications

- **Programming and Visualisation:** C, C++, parallel programming: mpi/omp/pvm3, SIMD, threads, Fortran. Perl (and cgi), Python, xml, html, php, asp, shell, awk, sed, tcl/tk, Javascript, Pascal, LaTeX, RPC sockets, Mathematica/Maple/MatLab, APL. MSDOS assembler (TSR, interrupt routines and real time dsp programming). OpenDX (IBM Data Explorer), Postscript, X-windows (Xt, Athena widgets), Motif, Java and Ada. Unit tests, regressions, path testing, valgrind, agile and waterfall environment, documentation.

- **SysAdmin**: Linux, Solaris (and SunOS), IRIX, AIX, HPUX, E&S, VMS, Windows (NT-XP), Mac, Samba, DNS/DHCP, BGP/RIP, IPv6, Apache, wifi, tcpdump/wireshark.

- **Relational Databases**: MySQL (DBI/DBD), PostgresSQL, Access.

- **Hardware**: Design and service high performance computer clusters (Beowulfs). Amateur radio license since high school. Two-way communication Earth-Moon-Earth, using Moon as a passive reflector, on 144MHz and 432MHz. Designed and built electronics since grade school; transmitters, receivers, yagi antennas, TTL logic, VHF and UHF construction (stripline), Gunn diode oscillators, DSP for weak S/N. Use standard machine shop tools; end-mill, lathe, drill press, sheet metal bender, tap and dies, rebuilt two car engines.

- Ph.D. in Biochemistry. Research at Yale University; National Institutes of Health, Bethesda, MD; National Cancer Institute, Frederick, MD; U.S. Department of Agriculture, Beltsville, MD; U.C. Davis, CA.

Lockheed-Martin, contractor to EPA   1999-present
Senior Systems Engineer, High Performance Computing (HPC): maintain the HPC systems, write technical papers, make unsolicited proposals.

- In collaboration with a colleague, designed a low cost, low latency, Clos infiniband network for a 2016 core Nehalem HPC cluster in Marietta, GA. The Clos design reduced the number of crossbars in the switching fabric by a factor of 5.4 and reduced the latency from 8 to 6 hops.

- Improved system performance in a 256 CPU HPC system, by a factor of upto 20, by analysing disk access patterns. This work was cited by the EPA in accomplishments for the year for our section.

- Proposed and implemented python support on the HPC systems. By understanding the user's requirements and the EPA's constraints, was able to liase between the two groups, to build a credible case to change EPA policy to allow python support.

- Proposed, developed and installed a web based tool for managers to graphically monitor 40 parameters of a 256 CPU HPC cluster. Replaced tables built from scripts and Unix administrative tools.

- Developed a web based database query tool to search for information on chemical entities of interest to the EPA. Now in use to enable public access to the EPA's databases of hazardous and toxic chemicals.

- Developed realtime 3-D stereo visualisation of data collected by a towed scientific platform monitoring the Great Lakes. Tool ensured complete data coverage of the lake volume, in the time available on the boat. A sample graphic was used in a Lockheed-Martin publicity poster.

- Wrote a tool to automatically quantitate damage in lung tissue caused by environmental hazards (*e.g.* smoking). as detected in stained photomicrographs of tissue. Replaced manual counting of areas on micrograph.

- Proposed innovative method of utilizing clusters of low cost GPUs for high performance computing. On my own time, attended several courses in GPU programming familiarizing myself with GPU programming techniques.

- Proposed use of the free statistical package R instead of the expensive SAS statistical package. Interviewed SAS users to determine feasibility and requirements for a changeover. Proposal has been implemented, with R in wide use, and new statistics code being written in R,

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Alphatronix (a division of Auspex)   1998
Build Engineer, SysAdmin for 66 developers and 160 computers. Solaris, HPUX, AIX

- Completed conversion to full automation of the nightly backup and build, from repository to installable packages.

Duke University, Xray Crystallography Laboratory   1995-7
Lab Manager: maintained Xray crystallography equipment, 40 computers. IRIX, AIX, VMS.

- Proposed, designed, purchased and installed the first Beowulf at Duke University. Used 64bit DEC Alpha computers for floating point performance. Much of the project's effort was in educating the end user who was then able to start a research program of *in silico* protein folding.

Other Experience

- **Linux Virtual Server (LVS) project**   1999-present

  LVS is a Linux kernel based, layer 4 highly available (HA) load balancer. I maintain the HOWTO and wrote the early configure and failover code. Was the main respondent on mailing list for 8 yrs.

- **AZ_PROJ azimuthal equidistant map server**   1994-present

  The map server generates 10,000 maps/yr. Co-authored the original code and have maintained the code and the mapserver at **http://www.wm7d.net/azproj.shtml** since 1996.

- **Wifi installation in Hospital** 2008

  Installed wifi in a hospital to allow Doctors and staff to access patient records through hand-held PDAs. The WAP was modifed to flash the power LED to indicate the number of associations.

- **Teaching** 2000-present

  3rd grade Science; programming and physics to middle/high school advanced students. Here is a 30 min video of me teaching about the Platonic Solids, trusses and having the kids assemble the icosahedral NOAA globe of the earth. **http://www.austintek.com/icosahedron_class/**.

- **Treasurer: North Carolina Systems Administrators** 2000-2003

  Converted 10yrs of financial records to double entry format, organised paper records using standard accounting methods, to facilitate record keeping, auditing and a possible conversion to a 501(c)(3) Corporation.

- **Non-computing**: Pilot Officer, Royal Australia Air Force (RAAF), graduated with Efficiency Award. Queen Scout 1965 (Australian Eagle Scout). Professional Soccer Referee grade 8, 2007-9, youth soccer. Amateur soccer referee and coach, 2000-7. Sydney University Lightweight Crew (Rowing) at Australian University Championships 1971,73. Novice crew coach 1972,1974.

- US Citizen.

- **Presentations:**

Linux Virtual Server:	Software Freedom Day, UNC	Sep	2007
Outsourcing in the Information Technology Industry:	NC SysAdmins, NC	Jul	2004
Gnucash and double entry accounting:	NC SysAdmins, NC	Jul	2001
Aurora of 15-16 Jul 2000: Analysis of Amateur Radio Logs			
	N.E.W.S. Conference, CT	Aug	2000
The Spring Sprints: Analysis of Amateur Radio Logs	N.E.W.S. Conference, CT	Aug	1999
Linux Virtual Server:	NC SysAdmins, NC	Jun	1999
Linux Virtual Server:	Linux Expo, Raleigh, NC	May	1999
AZ_PROJ: Azimuthal Equidistant Map Projection Software			
	Central States VHF Conf., TN	Jul	1994

Education

Ph.D. Biochemistry, Sydney University, Sydney, Australia
B.Sc.(Hons) Organic Chemistry, Sydney University, Sydney, Australia

A 2 page resume is available at http://www.austintek.com/#about_joe