

**Resume
of
WALKER MANGUM**

SUMMARY

Computer systems engineer/architect with 45+ years experience in computer-based control, data acquisition, data processing, and communications systems. Primary expertise in:

- Real-time systems architecture, infrastructure, middleware and application software
- Concurrent (multithreaded) processing
- Client/server applications
- Communications and networking
- Computer operating systems
- Automated control systems
- Web-based applications

Proficient at all levels, including system and requirements analysis, systems architectural design, infrastructure design and implementation, middleware design and implementation, compiler design and implementation, database engine design and implementation, modeling, control loop design, hardware and software specification, application design and implementation, user and technical documentation, system testing, troubleshooting and debugging down to machine-code level.

Comfortable working with any platform, operating system, or language.

Well-known for rapid problem solving capabilities, rapid prototyping and implementation, and delivery of top-quality maintainable products on-time and within budget.

Frequently involved as leader of rapid response (“tiger team”) activities to solve critical problems or to rescue projects.

Experienced in forensic analysis of computing systems and software.

EDUCATION

Bachelor of Science, Aerospace Engineering
Mississippi State University, 1970

Graduate Level Studies
NASA Space Technology Summer Institute

Graduate Studies in Systems Engineering
University of California, Santa Barbara

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REFERENCES *Furnished upon request.*

EXPERIENCE

Long Bay Villa Association Billing System *April, 2014 – Present*

Designed, developed, implemented, and providing ongoing support for online billing system for Long Bay Villa Association (LBVA). LBVA provides electricity, water, landscaping, and pest control for property owners at Long Bay on Tortola in the British Virgin Islands. The cloud-based billing system handles all of these items. Electricity and water meter readings are directly uploaded from spreadsheet. Invoicing is done with a single click. Bills are automatically collected from credit/debit cards through PCI-compliant collection. All billing system data is contained in a database that provides comprehensive reports and complete audit trail for all transactions. System includes a wide variety of reports in both tabular and graphical formats.

Energy Management System Design, Development, and Support *March, 2008 – Present*

Providing ongoing consulting services for design, development, and support of energy management system (EMS) and distribution management system (DMS) software for one of world's leading suppliers of EMS/DMS systems. Primary responsibility is providing first-line rapid response to critical problems encountered by EMS/DMS system users.

Energy Management System Porting *May, 2004 – March, 2008*

Provided ongoing consulting services for porting Alpha/Unix based energy management system (EMS) software to Intel Itanium/HPUX for one of world's leading suppliers of EMS systems.

Electric Power Real-Time Market Trading System *March, 2003 – May, 2004*

Interfaced ORACLE-based real-time electric power market trading system to proprietary energy management system (EMS) for major independent system operator (ISO). Designed software interfaces and database layer that allow business management system (BMS) applications to transparently operate in EMS environment.

Space Shuttle Cockpit Avionics Upgrade *September, 2002 – March, 2003*

Provided systems engineering support to United Space Alliance for Space Shuttle cockpit avionics upgrade project. This project replaced the shuttle cockpit flight control and command displays and interfaces with state-of-the-art "glass cockpit" instrumentation.

Trajectory Systems Architecture and Engineering *June, 1997 – September, 2002*

Principal systems architect and principal systems engineer for new-generation NASA Johnson Space Center space vehicle trajectory system. Served as technical lead for this five-year project from inception through completion and delivery. Project was completed on schedule, on budget, and exceeded NASA quality and performance expectations by a large margin. System went to fully commissioned status ahead of schedule. This was the

system used by NASA Space Shuttle flight controllers in the Mission Control Center (MCC) for Space Shuttle flight navigation, guidance, control, and tracking.

Received United Space Alliance President's Award for Exceptional Achievement and Lyndon B. Johnson Space Center Group Achievement Award for project achievements and performance.

Project responsibilities and accomplishments included overall system architectural design, specification and design of system infrastructure components, implementation of system architecture and infrastructure, and system testing. System is UNIX-based with redundant primary server systems with hot backup capability for rapid failover to backup.

System architecture is event-driven client/server model with large number of individual servers. Communications is via TCP/IP, UDP, multicast, System V message queues, shared memory, and semaphores.

Developed integrated relational database system, including database engine, compiler, and database maintenance tools. Database compiler reads standard C header files to define schema, ensuring consistency between application source code and database definition.

Developed TrajTool application that can simulate full trajectory server environment, allowing application developers to do unit test and full regression test of individual processes. TrajTool is based on Tcl/Tk, with many added commands written in C as Tcl extensions. Added commands allow full local and remote database access, full network communications capability, logging and delogging, interface to native binary C data structures, and a full-featured script debugger.

All MCC trajectory server control user interfaces (GUI) are based on TrajTool.

Space Shuttle Command System Rehost

October, 1994 – June, 1996

Principal systems architect and principal systems engineer for rehost of NASA JSC space shuttle command system. Responsibilities and accomplishments include overall systems architectural design, specification of systems infrastructure components, implementation of system architecture, and system testing. System is UNIX-based with redundant primary server systems with hot backup capability for rapid failover to backup. Developed integrated relational database system, including database engine, compiler and database maintenance tools.

NASA Operational Data Reduction Complex (ODRC)

February, 1996 – December, 1996

Designed and implemented system status server and operator interface allowing ODRC operations personnel to monitor operation of large-scale optical data storage jukeboxes used for archiving all space flight data.

NEXRAD Weather System Data Processor

March, 1995 – May, 1995

Designed and implemented system to integrate real-time NEXRAD radar data with satellite imagery for use by NASA Space Flight Meteorology group.

OSF/1 Software Port

October, 1993 – April, 1994

Assisted a major supplier of power and utility energy management systems in porting large real-time software system from Intel iRMX-286 operating system to DEC OSF/1 (UNIX)

operating system. Implemented automated code translation process that was used to convert over 3,000 modules containing over 250,000 lines of Intel PL/M source code to OSF/1 C source code. Approximately 80% of modules required no modification to compile and operate correctly on OSF/1 system. Remaining modules required only slight modification. Further assistance included system architectural guidance and implementation assistance, down to machine-code level tracing and debugging. Implemented numerous system analysis and debugging tools, including system analyzer tool for OSF/1 operating system that displays all processes and thread states, CPU utilization, and other information, with real-time update. Tool is fully configurable for process items that are to be displayed and display refresh rate.

Energy Management System Development and Testing *January, 1987 – July, 1993*

Assisted in the development and testing of new system architecture for a major supplier of power and utility energy management systems. Responsibilities included system-level specification, system-level design, and supervision of implementation and test of large-scaled distributed SCADA.

Plant Communications and Computing Architecture Plan *1991-1992*

Participated in development of Plant Communications and Computing Architecture Plan methodology for Electric Power Research Institute (EPRI). This methodology provides a step-by-step method for evaluating current plant-wide communications and computing requirements for a nuclear power plant and generating a plan for integrating plant systems and accommodating future needs in a cohesive manner. It defines the requirements for a network architecture that will support power plant instrumentation and control (I&C) systems. This architecture provides the infrastructure for efficient, cost-effective implementation of new and upgraded systems. In addition, the architecture allows interoperability with other plant systems and facilitates common human-machine interfaces.

Systems Engineering Consulting – System Upgrades *1991*

Provided systems engineering consulting to major utilities and Electric Power Research Institute (EPRI) for upgrade of existing system architectures and networks to open architecture.

Methodology Development *1991*

Developed methodologies for major aluminum producer for system development, system documentation, change management, and disaster prevention.

MODCOMP PC Workstation for Windows *1990*

Designed, developed, and provided ongoing product support and enhancement of the PC Workstation for Windows integrated communications product for transparent communications and networked disk file handling between IBM Personal Computer and MODCOMP computer systems. Product included asynchronous and TCP/IP connectivity and TELNET support. Product included a complete programming environment for script application development, including C compiler and multi-tasking execution engine. PC Workstation for Windows was distributed by MODCOMP as a standard MODCOMP product.

SCADA System Development *April, 1986 – December, 1987*

Designed, developed, and implemented various portions of new generation SCADA system for leading provider of SCADA systems to large electric utilities, including real-time executive, communications, and custom operating system elements.

SCADA System Support *October, 1984 – March, 1986*

Provided complete system support for leading provider of SCADA systems to large electric utilities, including total responsibility for real-time operating system, custom operating system elements, executive, and computer-to-computer communications functions on MODCOMP-based SCADA product.

SCADA System Port *1981-1984*

Ported large-scaled SCADA system from DEC PDP-11 to MODCOMP CLASSIC.

MODCOMP VISION and VISION/32 Real-Time System Analyzers *1981-1990*

Designed, developed, and provided ongoing product support and enhancement of the VISION and VISION/32 Real Time System Analyzer products for MODCOMP-MAX IV and MAX 32 operating systems. VISION and VISION/32 were distributed by MODCOMP as standard MODCOMP products.

Mid-Deck Rotator Engineering Study *1985*

Performed engineering study for NASA contractor to determine control system problems with existing NASA Mid-Deck Rotator flight hardware. Study included development of dynamic computer simulation of existing hardware, based on laboratory tests performed as part of the study. Final engineering report isolated various weaknesses with existing system and included recommendations for modifications to improve system performance and controllability.

Graphic Data Display System *1984*

Designed, developed, and implemented a Graphic Data Display System used to display test data acquired in real-time in various NASA Johnson Space Center laboratories. IBM PC-based system provides continuous real-time graphic display, trending, and archiving of data acquired by MODCOMP-based data acquisition system.

Operating Systems Maintenance *1980-1983*

Provided complete operating system support and maintenance for major oil company, including O/S enhancement, implementation and maintenance of custom O/S elements, revision level upgrades, and debugging of vendor O/S problems.

Solar 1 Power Plant *1982*

Provided on-site integration support for installation of man-machine interface and supervisory control system for Southern California Edison "Solar 1" experimental solar power plant.

Documentation Standards *1982*

Provided consulting services for a major oil company, generating internal documentation standards for process computer systems project development.

Laboratory Data Management System 1981

Performed systems consulting services for a major oil company, providing guidance in design and installation of a large laboratory data management system.

SCADA System Communications Interface 1981

Designed, developed, and implemented embedded microprocessor-based communications concentrator/translator to interface SCADA system with RTUs using non-standard pseudo-synchronous communications protocol.

Data Base Subsystem Development 1981

Designed, developed, and implemented real-time data base subsystem for standard SCADA product. Data base subsystem included transparent access to both memory-resident and disk-resident data base elements, shared database element access, and data base generation.

Operating Systems Maintenance/Systems Consulting 1980-1981

Provided ongoing MODCOMP operating systems maintenance and systems consulting services for NASA Johnson Space Center.

Pipeline Data Acquisition System 1980

Designed, developed, and implemented data acquisition and data communications software for specialized high-speed data acquisition system used for analysis of pipeline crude oil flow problems in the Alaska Prudhoe Bay oil field. Performed field supervision of hardware/software installation and system test.

Graphite Plant Computer Systems 1980

Provided guidance in selection of process computer hardware, based on specific plant requirements, for various graphite plants for leading worldwide producer of carbide/graphite products. Supervised system installation and testing at numerous foreign and domestic production plants.

Process Computer Power Fail Recovery System 1980

Designed, developed, and installed hardware/software system for major aluminum manufacturer to automatically bring process computer system back to full online operational state after complete power failure. The computer manufacturer had previously been unable to satisfy this requirement.

Barge Energy Management System 1979

Designed, developed, and implemented microcomputer-based energy management system for petroleum barges carrying crude oil on Mississippi River. Microcomputer-based EMS master station and microcomputer-based RTUs, with RTU communication via VHF radio transceivers.

Refinery Data Acquisition System 1979

Designed, developed, and implemented complete SCADA system for operation of petroleum refinery, using central minicomputer and remote RTUs. System included real-time color graphics, with full complement of data acquisition, logging, alarming, trending, historical data processing, and display generation.

Compressor Research Facility

1977-1979

Technical leader and manager for design and installation of facility control test article control and data acquisition systems for Turbine Engine Compressor Research Facility located at Wright-Patterson Air Force Base. Designed all control loops for system, based on extensive analysis and simulation of the plant.

Facility control system performed direct digital control of 30,000 rpm / 30,000 h.p. variable speed electric drive system. Test article control system provided fully automated sequencing and control of test chamber pressure, test article pressures, and variable geometry equipment. Data acquisition system capable of data acquisition at 466,000 samples per second. Total of nine computers, from minimal minicomputer to large IBM mainframe, and two programmable logic controllers used in facility. Communications via high-speed network links and shared memory.

Fiberglass Batch Mix Computer System

1978

Designed, developed, and implemented stand-alone process control computer operating system for automated fiberglass binder mix process, allowing full system support from minicomputer. Designed and developed operating system modifications to allow operating system to boot from and reside on floppy disks, including volume management for dismountable floppy disks. The computer vendor did not support floppy disk-based operating systems.

F-100 Engine Simulation

1977

Designed, developed, and implemented real-time simulation of F-100 turbofan engine for control systems verification. Simulation ran in background of digital control computer, and provided realistic simulated engine response to control outputs. Simulation resulted in major cost reduction for control logic development and testing.

F-100 Engine Stall/Stagnation Study

1976

Designed, developed, and installed fully digital implementation of bill-of-material F-100 turbofan engine electronic/hydro-mechanical control system for USAF stall/stagnation study. Developed and implemented custom control logic for parametric analysis of stagnation phenomena.

Digital Electronic Engine Control

1975-1977

Designed, developed, and implemented control logic for all-digital control of new generation turbofan engines. In addition to control logic, designed, developed, and implemented utilities for rapid engine data acquisition and performance analysis.

Operating System for Turbojet Engine Control Development System

1976

Designed, developed, and implemented multitasking operating system for digital turbojet engine control development system, including operator console support, I/O services, mass storage control, program loader, named file system, and resident on-line debugger with assembler/disassembler.

JFC-89 Electronic Engine Control

1974-1976

Designed, developed, and implemented supervisory control logic and software for production F-100 turbofan engine currently installed in production USAF F-15 and F-16

fighter aircraft. Granted U.S. Patent 4,112,499 for digital filtering logic developed for this control system.

Macro Assembler Development 1974-1976

Designed, developed, implemented, documented, and supported complete macro assemblers for two different microprocessors used for turbofan engine electronic control systems.

Jet Propulsion Systems Test Engineering 1970-1973

Designed and developed test rigs, control systems, and data acquisition systems for various experimental ramjet and turbojet propulsion systems. Supervised test programs and development of data analysis software with interactive graphic data display. Granted U.S. Patent 4,003,201 for ramjet system concept.

LEGAL CASE EXPERIENCE

Gyrodata, Inc. v Baker Hughes, Inc. 2001

Theft of trade secrets.

Scientific Drilling International, Inc. v Gyrodata, Inc. 2008

Patent infringement.

***Gyrodata, Inc. v Gyro Technologies, Inc
and Dataflow Measurement Systems, Ltd.*** 2010

Patent infringement.

Gillani Consulting, Inc. v Ferguson Enterprises, Inc. 2010

Copyright infringement.

***Canrig Drilling Technology Ltd. v. Omron Oilfield and Marine, Inc.
and Helmerich & Payne, Inc.*** 2010-2011

Patent infringement.

PERSONAL INFORMATION

Achiever: Amateur Radio Operator's license at age 11, Pilot's license at age 17

Gifted in concepts and algorithms in mathematics and logic. Winner of elementary and high school awards for highest cumulative mathematical scores.

Married

Part time resident of Anegada, British Virgin Islands

Interests include flying, photography, fly fishing