

RAYMOND P BURKHOLDER, B.Sc.
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Career Path

Systems Architect: network engineering, software development, server management, automation.

Summary of Qualifications

- Over 25 years of experience in the technology field
- Work well with management, peers, vendors, consultants, and customers.
- Well developed communication skills
- Proven experience in technology troubleshooting and integration
- Able to handle multiple projects simultaneously
- Equivalent Skill Sets: Architect, Site Reliability Engineering (SRE), NetDevOps
- Broad background in networks, security, storage, virtualization, software development
- Diversified cross platform skill sets: Networks, C++, Python, database, Linux, Windows, Mac
- In-depth knowledge of LAN/WAN/DC engineering design and management
- Manage Personal BGP AS10388

Links

Blog: <http://blog.raymond.burkholder.net>
GitHub <https://github.com/rburkholder>

Professional Experience

October – December 2019, Trans Mountain Corporation

Datacenter Architect – Datacenter Migration, Disaster Recovery Design, Backup Targeting

The Canadian Government took over Trans Mountain from Kinder Morgan in order to push through Trans Mountain Pipeline Expansion Project from Edmonton, Alberta to the British Columbia Coast. This is a massive civil engineering project. Significant changes are also being undertaken in the Technology Support groups.

My role was initially as subject matter expert for migrating equipment from datacenter to datacenter and improving some network monitoring functions. During the three month contract, I have had an influence on:

- how datacenter selection and siting would be defined between Calgary, Edmonton, as well as possible locations in BC
- converting mindsets to think of active/active style datacenters rather than primary/disaster-recovery based schemes (and all the operational changes required to support the mindset)
- direct interactions between CTO, Infrastructure Program Manager, Project Managers, and Business Analysts for high level architectural designs for changes to the virtualization environments to better handle shifting workloads and their security
- speaking the lingo of the software developers to understand their needs for disaster-recovery as well as mainline business application support
- creating an understanding with operations support personnel and managers on how an active/active datacenter solution needs to operate in order to provide tight RTO time frames
- speaking with network operations people and server operations people to help define what their expectations of a new operating environment might involve
- generating an immediate savings of \$400,000 by redefining how workload storage was to be purchased and used for migrating workloads from one datacenter to another
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- working with Enterprise Risk Manager to define how new technologies can be safely integrated into revamped operations support workflows (through significant training and including operations teams in the design decisions, testing, and implementation phases of new technology)
- generating design documentation, specifying network / hypervisor / security / cabinet components, managing timeline expectations, and rendering appropriate costing spreadsheets in support of recommended designs
- <https://blog.raymond.burkholder.net/index.php?/archives/1032-Thoughts-on-Redundant-Datacenters-Multi-Site.html>

June 2018 – Present, One Unified Net Limited, Alberta, Canada

Owner, Consultant

- Consulting to QuadLii, building an SDN solution incorporating:
 - a custom C++ controller with Emweb wt for web based interface
 - interfaces to eBPF/XDP on Linux to handle packet accept/deny decisions
 - Using Linux netlink calls to obtain interface attributes and statistics
 - DNS intercepted and vetted via API to third party service
 - Boost ASIO for communications within a microservices architecture
 - PostgreSQL & Cassandra, database management
 - running Linux networking (iproute2, Free Range Routing(BGP, EVPN, Anycast), Open vSwitch)
 - designed to run on SBC boards and Lanner network appliances
- Building scalable corporate web site with backend composed of a) clustered Cassandra database server, b) middleware messaging service, and Wt/C++ server side web rendering toolkit.

March 2017 – April 2018, Kwaret, Bermuda

Android Tinnitus Masking Prototype

Java based visual interface for selecting and mixing: pink/white noise, frequency, and mp3 music
 C++ based service for handling sound generation, mixing, timing, delay
 used DSP techniques for low pass, high pass, band-pass adjustable filters
 implemented adjustable white/pink noise generator

April 2014 – May 2018, QuoVadis Services Limited, Bermuda

Cloud Services/Infrastructure Architect/SRE, Development and Operations, Reporting to CEO

- Working with team members to evaluate and resolve incidents. Performing root cause analysis. Communicating with management, stakeholders, and team members throughout the process.
- Researching, designing, and recommending process and infrastructure changes to improve stability, maintainability, and monitoring
- Designing scalable, highly resilient hosted infrastructure solutions for datacenter and wan customers
- Leading design and technology education/selection sessions with management and team members
- Evaluating and integrating new technology, products, and services
- Configuration building, scripting, troubleshooting, service provisioning, performance tuning
- Building orchestration/automation tools with SaltStack, dnsmasq, Python, shell, PXEBoot, Debian PreSeed for building/provisioning Linux based routers, switches, distributed firewalls, hypervisors, and virtual machines
- Using automation toolsets to migrate IaaS infrastructure from a traditional L2/VLAN architecture to a L3/Routed/Encapsulated/SDN based architecture with eBGP/EVPN//Open vSwitch/OpenFlow
- Maintaining perimeter BGP (AS19626) connections to upstream providers with full tables, load balancing, route-maps, and route-reflectors
- Network infrastructure management – Arista Switches, Cisco Switches, Vyatta Routers
- Installing, maintaining and populating NetBox for infrastructure IP Address Management
- Automating provisioning of guests in a clustered VMware environment
- Virtualization infrastructure – managing and supporting VMware, Linux KVM, Linux LXC
- Linux Security: ssh, nftables, basic Squid, StrongSwan IPSEC
- Monitoring/Operations Infrastructure – Bind9, NTP, Nagios/Check_MK, Rancid, Redmine, NFSEN/Netflow

- Security infrastructure – Stonegate/PaloAlto/CheckPoint Firewalls, Intrusion Prevention
- Storage infrastructure: SolidFire SSD based SAN, Nexenta dual head SAS/SATA iSCSI/NFS SAN
- Designed and implemented 100% open source based Hyper-Converged Platform built upon three Lanner NCA-5510A Network Appliance for providing robust traffic, virtualization, security, and storage management. (VxLAN, MP-BGP, eBGP, EVPN, LXC, nftables, TC/QoS, ZFS, BTRFS). BGP based anycast load balancing and resiliency.
- Implementing a style of Software Defined Networking (SDN) / Network Function Virtualization (NFV) solution.
- Working with Amazon AWS Cloud and Google Cloud services.
- Mentoring/training team engineers with test environments based upon Vagrant/Ruby (see github)
- Initial trial of Sheepdog on ZFS volumes for distributed storage.
- Working with YubiKey two factor authentication
- Updated C# code as a sub-contract to national government department for reporting to IRS

October 2013 - March 2014, IBM / Bermuda Computer Systems / Igility, Bermuda
Network Consultant

- Managing / troubleshooting / architecting customer networks.
- Working with Bermuda Hospital Board network staff to assist with migration and integration of existing dual 6509E Cisco core network with new dual Nexus 7000 core network.

August 2013 – February 2014, NeuralFutures LLC [contracted hours]
C++ Developer / Linux Admin

- Working in conjunction with a UK developer to develop an application for simulating and trading equities, options, and futures. Making use of C++ libraries Boost, HDF5, ChartDir, SQLite, Curl, and wxWidgets. This is based upon code I've developed over the last four years.
- Managing two physical servers, each running Linux, in a NY colocation facility. These servers host personal DNS, Email, web sites and Software as a Service capabilities via LXC containers and KVM virtual machines. Traffic is routed between the servers via Quagga OSPF and to the upstream carrier via redundant connections with Quagga BGP.

October 2011 – July 2013, Digicel Bermuda (Digicel Acquired Transact)
Manager, Network Operations, ISP

- Managing Transact ISP network operations of Digicel
- Architecting and coordinating the migration of a traditional ISP network into fully enabled private/public IP/MPLS/VPLS infrastructure for handling a variety of public and private MPLS VPN based data and voice services. Integrating various Cisco products: 7600, 7206, ME3750, ME3400E, ISR3800. AS32020 BGP operations.
- For the operations side of Digicel Bermuda: evaluating and making recommendations for performance tuning, fault-tolerance, and enhancing a two site network comprised of four Cisco 4500 switches, two clusters of Enterprise licensed VMWare servers, HP Lefthand Networks iSCSI SAN, HP EVA 4000 Fibre Channel SAN, NexentaStor, and Symantec NetBackup with TB Enterprise licensing.
- Working with Solarwinds to monitor Digicel back office network.
- Site to Site VPN creation via mixed CheckPoint / Cisco ASA end-points
- Supporting the Business Development Group with pre-sales design along with post-sales implementation and support.
- Mentoring and training engineers on the operation of the network.

2008 – September 2011, Transact Limited, Bermuda

Manager, Network Operations, ISP

(SBI and Transact were owned by same person, this was a transfer from one subsidiary to another)

- Provided dedicated 24x7 on-call client support
- Level 3 support including shift work weekdays, weekends, and graveyard shift
- Training and ongoing support to level 1 and level 2 technicians

- Diagnosed and repaired network and service faults
- Performed capacity & reliability analysis & planning
- Built redundancy into new and existing services for superior availability.
- Configured and operated Cisco switches, routers, and firewalls
- Implementing appropriate forms QoS on traffic circuits. Implementing IP SLA monitoring.
- Migrated EIGRP based network to BGP/OSPF/MPLS
- Using Cricket for SNMP monitoring, NfSen/NFDump for Netflow analysis, Rancid for versioning
- Managed physical servers including a VMWare based host environment
- Managed local services, including Bind for DNS; CommuniGate for SMTP, IMAP, POP3; Apache for HTTP; FreeRadius for RADIUS; PostgreSQL and MySQL for SQL
- Customized Perl and Shell scripts to integrate BillMax (ISP Billing System) with FreeRadius (network Authentication/Authorization/Accounting server), used for authenticating/authorizing PPPoE/PPTP clients connecting via Cisco 7206 Access Servers.
- Administered and maintained a mixture of Linux and FreeBSD based servers, operating systems, and services
- Provided Sales Engineering Support for recommending and designing appropriate solutions
- Liaised with local and international carriers for service improvements and upgrades
- Maintained network documentation
- Acquired IPv6 and additional IPv4 address space from ARIN
- Started implementation of IPv6 throughout Transact's Network

2005 – 2009, Self Directed, Bermuda

Developing Trading Application using SmartQuant C# Framework

- C# based platform for high frequency trading
- Some code results:
 - <https://github.com/rburkholder/QuantDeveloper>
 - <https://github.com/rburkholder/GeneticProgramming>

2004 – 2008, Systems Business Integration Ltd / Igility Ltd, Bermuda

Senior Systems Technologist

- Went on sales calls with the sales team to understand customer requirements and needs
- Provided designs and support (BoM, SoW) to the sales team, and assisted in developing proposals and presentations for deployment of products and solutions.
- While working on 'current' solutions, staying in touch with the customer base to see what is coming down the pipe
- Presenting demonstrations and solution proofs-of-concept
- Building Cisco CallManager/Unity/AVVID/QoS solutions
- Designing, building, troubleshooting, maintaining Cisco networks for routing, switching, VPN (IPSEC, SSL), firewalling, Intrusion Detection, and SLA monitoring.
- Using routing protocols: RIP, OSPF, BGP, EIGRP
- SQL: developing and troubleshooting Microsoft SQL databases with stored procedures and clusters
- Sub contracted to:
 - Bermuda Fire & Marine (On Bermuda Stock Exchange)
 - Axis Specialty (NYSE:AXS)
 - Arch Re Insurance, a member of Arch Capital Group Ltd (Nasdaq:ACGL)
 - Max Re Capital Ltd. (Nasdaq:MXRE)
 - Bank of Butterfield (On Bermuda Stock Exchange)
 - Montpelier Re (NYSE:MRH)
 - ACE (NYSE:ACE)
 - PXRE
 - Hamilton Princess Hotel
 - Saltus Grammar School
 - Tucker's Point Club (Bermuda's Premier Golf Resort)

2002 – 2003, 2005 Choice Communications, US Virgin Islands

Network Architect

- Managed the Internet Operations Department of a full service Internet and Television ISP
- Worked to reduce daily network incident rates
- Planned and budgeted for service improvements, new products, and network expansion
- Mentored a technical team of people with skills in Cisco router/switch/security technology, software development, Linux servers, and Microsoft products.
- Reduced dial-up issues
- Improved ISO Layer 1, Layer 2, and Layer 3 connectivity and reliability.
- Improved eBGP multihoming arrangements and internal OSPF routing configurations
- Implemented SNMP network management and monitoring with Cricket/NMIS/NAGIOS/RANCID
- Worked to improve wireline/wireless integration with BreezeCom, Alvarion, Hybrid, and AB Access radios.
- Troubleshooting DS3 and NTP network issues on a 7206VXR based network.

1995 - 2002, One Unified, Kitchener, Ontario

Project Manager, Technology Integration

- Providing full life-cycle pre-sales, sales, design, implementation and support
- Open Source Asterisk IP Telephone consulting
- IVR (Interactive Voice Response) systems, Voice Recognition systems.
- Vovida/SIP/Linux Implementation
- Distributed IP Telephone System Design & Installation
- Microsoft Exchange Server 2000 Installation, Configuration & Maintenance
- Windows 2000 Active Directory Installation, Configuration, & Maintenance.
- Cisco IOS router configuration packet filtering, EIGRP, RIP, OSPF, BGP4
- Familiar with routing technologies: RIP, IGRP, EIGRP, OSPF, BGP4
- Worked with Microsoft SMS Network Analysis/Sniffer Tool
- Cisco Switch/Router based VLAN and multi-layer switch configurations
- Cisco IPSEC based Router to Router virtual LAN over DSL, ISDN
- Wireless voice & data networks
- T1/PRI/DSL/BRI services selection and provisioning
- Firewall design & implementations with Cisco IOS/ IP/FW, MS Proxy.
- Certified installer for 3M Fibre, Hubbell Copper & Fibre
- TCP/IP, DHCP (Cisco & W2K), WINS, DNS (BIND & NT) integrated configurations
- Network Monitoring and alerting with CastleRock SNMPc, CiscoWorks, HP OpenView
- Linux, Unix, Windows 95, 98, 2000, XP
- C++ / C# Contract development

1998 – 2000 Merck Medco Rx Services of Nevada

- Develop Microsoft Visual C++ application for interfacing packaging machine to VMS mainframe
- Utilized multithreaded, object oriented programming model
- Migrated ODBC database connectivity to OLE/DB/ADO architecture
- Handle communications between a VAX VMS system using DECNet & TCP/IP protocols and an Allen Bradley PLC5 using RS-Linx/OPC drivers.
- Worked with PLC programmers, mechanical designers, mainframe developers, and operations personnel

1997 Johnsonite Floor Coverings

- Implemented C program in a manufacturing environment for data-logging values from: Allen Bradley SLC/03 PLC using DH-485 protocols, a string of Euratherm temperature controllers over RS-422, and a LaserMike measuring system over RS-232.
- Supervised software developer.

1996 Bell Northern Research (Nortel), Angstrom Engineering

- Thin Film Vacuum Deposition Equipment Automation
- Managed two software developers
- Designed and implemented a modularized, object-oriented, multi-threaded, Microsoft Visual C++ program to use process recipes for controlling thin film deposition under vacuum in a real time environment.
- Supervised software developer.

1985 – 1996 Limnoterra Atlantic, Inc.

- Embedded Systems Design, Software Development
- Provided full life-cycle design, development and support for Electronic Fish Measuring System, Electronic Ecobug Data Logger, Electronic Digital Calipers
- Designed, coded, and tested assembly language level embedded firmware which implemented a Forth-flavored token interpreter.
- Used Lex, YACC, and C to develop a tokenizer for translating Instrumentation Configuration Language source code into pseudo-code (p-code) instructions.
- Designed a general purpose hierarchical database engine. Engine field and record definitions were defined by a text based schema language read in by Lex/Yacc. The engine was used for controlling and validating Electronic Fish Measuring System collection sessions.
- Supervised test engineer and installation engineer.

Employment History

2018 -	Consultant
2014 – 2018	Site Reliability Engineer, Quovadis Services Limited, Bermuda
2013 - 2014	Network Consultant, IBM / Bermuda Computer Systems
2009 - 2013	Manager, Network Operations, <u>Digicel/Transact</u> , Bermuda
2004 – 2008	Senior Systems Technologist, <u>Systems Business Integration/Igility</u> , Bermuda
2002 - 2003	Network Architect, <u>Choice Communications</u> , St. Thomas, USVI
1995 - 2002	Project Manager, <u>One Unified</u> , Kitchener, ON
1985 - 1995	Systems Architect, <u>Limnoterra Limited.</u> , Kitchener, ON
1984 - 1985	Systems Analyst, <u>Wilfrid Laurier University</u> , Waterloo, ON

Professional Affiliations & Certifications

Member of Association for Computing Machinery (ACM)
Member of The Institute of Electrical and Electronics Engineers (IEEE)

Education

BS Mathematics, 1986; Wilfrid Laurier University

Public Code

C++, C#, Python, Java, & Ruby on Linux & Android: <https://github.com/rburkholder>

Seminars

Cloud Monitors Cloud: <https://www.slideshare.net/stargrazer/cloud-monitors-cloud>

Hobbies

Sound Mixing, Photography, Video, Animation, Lighting:

<http://youtu.be/-DJoa7yHdHQ> – Blender based animation of local bar, meshes from photogrammetry

http://youtu.be/k9kwGh_cZgo – Band video: Mohawk Radio

<http://youtu.be/ltK4Gzjpafo> – Band video: HiVibes