

PERSONAL INFORMATION

Name: Keith Chew Seng Ling
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Website: www.e3solutions.net
Date of Birth: 16 February 1976
Place of Birth: Malaysia (Permanent Resident in NZ)

EDUCATION

1995 – 1997
University of Auckland
Bachelor of Electrical and Electronic Engineering (Graduated with 1st Class Honours)
Direct entry into 2nd year (i.e. skipped 1st year)
Straight A's for all subjects in all years (Ranked 3rd in Faculty of E&E Engineering)

1994
International College, Malaysia
New South Wales Higher School Certificate = 98.46%

1990 – 1993
Penang Free School, Malaysia
Average grade for government exams = A

SPORTS AND ACADEMIC ACHIEVEMENTS

Represented Penang Free School in tennis, volleyball, athletics, long jump, triple jump, and high jump.
Awarded best athlete of the year in 1992.
Attained 17 awards and certificates from 1991 – 1997. Some include:
ACENZ Best Practical Work Report award (1997)
Prize for Top Grade in 4th Year Project: sponsored by RS Components (1997)
Runner-up for Best 4th Year Image Processing Project (1997)

WORK EXPERIENCE

Ports of Auckland [www.masterpilotexchange.com] (August 2020 – June 2025)
Contractor (Full Stack Senior Software Developer)

Keith was involved developing and maintaining Ports of Auckland's eMPX (master pilot exchange) software, used by ports all around the world.

<https://masterpilotexchange.com>

Keith also played a key technical role in the sale of the business. eMPX was ultimately acquired by Trelleborg Marine Systems, and he was responsible for leading the handover to the new development team. The transition and migration were executed successfully.

Software development: Node.js, PostgreSQL, React, PWA, Workbox, Figma.
Infrastructure: AWS (ECS, EC2, S3, CloudFront, Cloudwatch).
Continuous Integration: CircleCI.

Propellerhead Ltd [www.propellerhead.co.nz] (July 2017 – July 2020)
Contractor (Full Stack Senior Software Developer)

Keith was involved in various Auckland Transport (AT) projects, which included AT's website, Public APIs and Realtime messaging platform. In addition, Keith was also involved with other projects such as ALPR/ANPR, Passenger Counter and Parking availability systems.

Software development: ASP.NET, Ruby, Node.js, MS-SQL, Visual Studio 2015, Web Services, Java, HTML, XML, CSS, Javascript, React, JSON.

Infrastructure: Azure (API Management, RBAC, Logic App, VM, App Service, etc), JBoss AS.

Continuous Integration: Bamboo, Chef, VSTS/DevOps.

Urgent Couriers Ltd [www.urgentcouriers.co.nz] (Feb 2019 – April 2019)

Contractor (Senior Software Developer)

Keith was involved in building a Shopify App that integrates Shopify with Urgent Couriers' back-end system. This app allows online customers to select Urgent Couriers as a shipping option during checkout. In addition, a back-end administration section was developed to allow the Shopify administrators to manage the shipping jobs through Urgent Couriers.

Software development: Node.js, MongoDB, Shopify front-end and back-end SDKs, Urgent Courier API, React, Javascript, JSON, Papertrail.

Infrastructure: Azure App Service, VSTS.

Continuous Integration: VSTS.

PumpkinPatch Ltd [www.pumpkinpatch.co.nz] (June 2008 – May 2017)

Contractor (.NET Senior Software Developer)

Keith is responsible for the architecture, development and maintenance of Pumpkin Patch's public e-commerce websites. There are 7 websites, targeting 5 global markets, US, UK, AU, NZ and IRL. These websites have been designed to be highly efficient, robust and scalable.

An in-house content management system was also developed by Keith to allow key internal departments to update and manage the content on the external websites. It integrates with the main database of the company to extract useful information such as stock levels, sales data and pricing, which allows the users to intelligently manage the layout of the website for maximum impact in terms of sales and profits.

Summary of technologies used:

Software development: ASP.NET, MS-SQL, Visual Studio 2010-2015, Ext-JS (www.sencha.com), NHibernate, Nant, Bugzilla, Web Services, Java, HTML, XML, CSS, Javascript, AngularJS, JSON, MySQL, PHP, OAuth

Infrastructure: AWS, VMware virtualization

Integration: Facebook, Instagram, Twitter, Pinterest, YouTube, Google UA Enhanced Ecommerce, Microsoft Dynamics AX, DPS, PayPal

Mobile: Android, IOS, Xamarin

Big Data: Hadoop, Recommendation Engine, Fraud Detection

Endace Ltd [www.endace.co.nz] (July 2008 – Dec 2009) - 3 days a week

Contractor (Senior GUI Software Developer)

The development environment is Linux based, Ubuntu for desktop (development) and Fedora/Centos for servers/appliances.

Keith's primary objective was to refactor and rework Endace's flagship GUI application for Intrusion Detection System (IDS). The application was written in Java Swing, and it was transformed from a buggy (at a brink of being rewritten from scratch) to an extremely solid and reliable product. The primary function of the application is to receive network information (Snort events) from the server and processes/displays results in real-time.

Occasionally, Keith assisted other team members in web-development, in particular AJAX and Javascript. Keith has become familiar with the commercial framework used by the Endace, ie TallMaple.

Summary of technologies used:

Software development: Java Swing, Postgresql, SQLite

Trade & Exchange [www.te.co.nz] (Sep 2005 – Feb 2008)

Contractor (Technical Architect)

In September 2005, Keith helped Trade & Exchange (T&E) architect their new website (www.te.co.nz). Keith led a development team of 5 and also worked closely with the infrastructure team to streamline the deployment process. The website was deployed in a cluster of servers for maximum reliability, load balancing and failover. To ensure the website was kept strongly aligned with the business, Keith participated in weekly meetings with the both the operation and management teams.

In 2007/2008, his main role at T&E was focusing on designing new features and improving performance for the website. In addition to software development, Keith was also involved in architecting T&E's network infrastructure. He is extremely familiar with all aspects of the infrastructure, including firewalls, content switch, cluster farm, database replication and routers to name a few. The primary OS used for the servers is Linux.

Summary of technologies used:

Software development: Hibernate, Spring, Struts, Ajax, Jboss, Tomcat, Mysql

Infrastructure: HP DL360/DL380 servers, Alteon content switch, Sonicwall/Fortinet firewalls

Application Performance: Load balanced, highly concurrent architecture, achieving above 800 concurrent DB connections for a 2 node web system.

Synergy – Vodafone (July – August 2005)

Contractor (Technical Team Lead)

Before working with T&E, Keith spent 8 weeks working on Vodafone's Australia Heroes 3G VLive project. His primary role was being the team lead, liaising with other tech leads and developers from Vodafone's content partners. Keith is familiar with Vodafone's VLive deployment process, Partner Markup Language (PML), development/staging/preprod/prod environments. He also worked closely with other Vodafone teams such as the Content Delivery Team, Media Streaming & Download Team, Media Production Facility Team to ensure there are no technological barriers to the project.

Synergy [www.synergy.co.nz] (2002 – 2005)

Consultant (Architect/Senior Software Developer/Mentor/Team Leader)

Keith was involved in one of Vodafone's most prominent VLive projects, Mobile Topup. This project was developed for Vodafone to allow customers to perform financial transactions from their handset, eg check bank balance, topup account, etc.

This system is highly secure, and conforms to NZ's banking standards. It runs on a 2-node Weblogic cluster along with a 2-node Oracle RAC database cluster. It is built to be efficient, reliable and robust, achieving an availability of 99.99% uptime. The security is of the highest standard on all levels, ie class, application, J2EE container, operating system and data center.

Keith was one of the key resources in architecting, designing and implementing the system. Here were some specific areas of knowledge attained:

Application Security	Familiar with majority of the components in the JCE framework (Cipher, Key Generator, MAC, MessageDigest).
Banking Security	Implemented a JCE Provider that communicates with the Racal/Thales Host Security Module (HSM). Banks throughout the world use HSM for industry

	standard cryptography. Majority of the HSM functions were implemented, which included key generation, key translation, encryption/decryption, etc.
Application Server Security	Implemented custom security providers for Weblogic's Enterprise Security Framework. These providers are conformant with their SPPI specifications.
Financial Transaction Security	Familiar with the ISO8583 standard that is used by systems that want to transfer financial transactions in a secure manner.
Disaster Recovery	Familiar with the process of managing and rebuilding of LMKs in the event of a security breach, eg espionage, lost of database, etc.
Social Engineering Security	Familiar with the banking security procedures such as key custodians, authorized HSM operator, etc. Also familiar with the process of exchanging keys such as ZMKs and KEKs.
OTA Specifications	Implemented an OTA server according to the STK2.1 specifications and Java 0348 specifications. This component is used to send encrypted OTA messages to the SIM card.
SMSC	Implemented a highly robust SMS gateway according to the MMAP/SMAP specifications. It wraps vendor specific APIs, eg Noctor and Logica.
High Availability	All server components were developed with high availability in mind. Applications are run in a clustered mode, with automatic recovery processes in place.
Robustness	All server components were developed with the assumption that the process can be interrupted at any time. State machine technology is used to allow state recovery at all times.
Single Sign On	Web applications are built with single sign on capabilities. It uses custom encrypted tokens to carry user information from the central logon server to the individual web servers. This is similar to Weblogic's Identity Assertion architecture, or other technologies like SAML.

Apart from Mobile Topup, Keith has completed a self-study program to the Certified Ethical Hacker (CEH) course. He is still planning to sit for the 312-50 CEH examination.

JungleDrum Messaging System Ltd [www.jungledrum.co.nz] (2001 – 2002)

Software Architect (Team Leader)

Prior to joining the company, Jungledrum has a suite of products that were developed and deployed separately. As the Senior Software Developer, some of the responsibilities include:

- Implement an application framework to integrate all existing products, and allow easy introduction of new products.
- Oversee the design, implementation, testing, and documentation of the products.
- Work closely with 2 other senior developers and lead a team of 6 developers.
- Advance the company's technical standards through developing high quality, re-usable code.
- Develop technical solutions that meet client requirements.

New methodologies and technologies that I introduced include:

UML methodology and Code Standards

- Together Soft (refactoring and prototyping) & Rational Rose (designing)
- Common design practices and patterns

J2EE Technology

- Back-end servers using Jboss and Weblogic
- Integration of JMS using Message Driven Beans (EJB and non-EJB environment)
- Front-end architecture using Struts MVC pattern
- Highly scalable and flexible architecture (all servers are clustered)

Database technologies

- Relational and Object Data Modeling
- O/R Mapping
- Oracle, Sybase EAS, MSSQL Server, PostgreSQL, MySQL

Billing & Provisioning Architecture:

- Real-time tracking of user's account balance
- Online credit card payments via BNZ

Proceduralised software development environment

- Flexible directory structure
- Automated build, test and deploy process

Summary of additional skills attained:

J2EE: Up to date with latest specifications (including EJB2.1, JMS1.1), expert in J2EE design pattern, familiar with differences between different application-servers, understand when to use Session/BMP/CMP persistence.

Mobile Technologies: SMS/C, MMS/C, WAP, J2ME (PDA, cellphone)

AI Technology: Rule-based programming using Rete algorithm

Web Services: Axis (SOAP 2.0)

XML Technology: XMLT (achieve device independence - handheld, browser, cellphone)

RFCs: SMTP (RFC821), iCalendar (RFC2445, RFC2446, RFC2447), vCard (RFC2425, RFC2426, RFC2739)

Open Source: James, Castor, JESS, Mandarax, RuleML, Lucene, Struts, Barracuda, Tapestry, Cocoon, Quartz, Avalon, XDoclet, log4j, Ant, AGMS, Turbine, OpenLDAP, MVCSoft.

Achievements:

To date, the company has adopted many processes and design practices that Keith adheres to. Keith was a mentor to the developers, helping them write better code, refactor often and integrate daily. As a result, the overall productivity of the developers increased tremendously, allowing the company to decrease the time to market.

The products are now well version controlled and the build process is all automated. Maintenance is no longer a nightmare and using the "separation of concerns" pattern, bugs are easier to find and resolved.

Keith was involved with the major projects deployed to all of the clients, including local and international telcos: Telecom, Vodafone, EdgeWireless, Telstra, etc. Many of them involved high volume message transactions performed by a cluster of servers.

Zeacom Ltd [www.zeacom.com] (2000 – 2001)

Senior Software Developer (Technical Lead)

Keith was the Senior Software Developer in the Internet division of Zeacom. He focused mainly on R&D, working on new technologies and ultimately expanding Zeacom's market into the Internet arena. At the beginning of 2000, Zeacom had no Internet based products. A year later, the company introduced 3 new products that are well integrated with the legacy system: WebCallback, WebChat and Email Queuing. Keith was one of the key players in the development of this suite of Internet products.

Keith programs in both Java (primary language) and C++ (secondary language). He is familiar and keeps up to date with most of Java's and Microsoft's Internet technologies. Essentially, he is proficient in any field related to enterprise solutions.

Regardless of programming language, Keith emphasises on good software design. In all his work, Keith uses UML (Unified Modelling Language) to model, design and refactor the software architecture. This will provide:

- A good architecture foundation to the product
- Easy maintenance of the product
- Easy collaboration with other software developers

Summary of skills attained:

Telephony Technologies: VoIP, Chat, Callback, PBX (software & hardware) functionality, IP Phones

Versioning Control System: Concurrent Versioning System (CVS)

Automated Build, Test and Deploy of Projects: Jakarta-Ants, JUnit, CruiseControl

IDE: Microsoft Visual C++, Visual Café, Forte (main IDE), Visual Age, JBuilder

Object Oriented Design (OOD): Designing system architecture with reusable objects (TogetherSoft)

Design Patterns: Familiar with and apply common UML patterns (GOF)

Middleware Messaging System: Distributed messaging based on custom C++ and Java's JMS

Enterprise Design, Deployment and Distribution: Apache, Tomcat, Fireworks, Dreamweaver

Java's J2EE standards: Implemented and extended various standards

Backend Database Integration: JDBC/ODBC, MSAccess, MySQL, PostgreSQL

3rd party Application Servers: Tried various servers (JBoss, Enhydra)

Internet Security: Firewall setup (both custom Linux box or 3rd party Watchguard firewalls)

Web Hosting: Installing WWW server, DNS server, Email server (both Linux and Windows)

E-commerce Technologies: Online shopping cart, credit card gateway, XML, JavaBeans, EJBs

Cecam Consultancy Ltd (1997 – 2000)

Software Engineering

Global Positioning System (GPS)

Author of GPSMapper (Delphi)

This is a region mapping software for Auckland, New Zealand. It allows the user to assign custom area codes to different regions on the map. In addition, it also tracks taxi vehicles and displays them on the screen. GPS information is received via serial port.

Telephony

Keith has also branched into the realm of telephony. He is experienced in areas relating to Computer Telephony Integration (CTI), Interactive Voice Response (IVR), Voicemail, telephone systems, Private Branch Exchange (PBX), Call Centers.

Keith is the author of WinIVR (Delphi), a program capable of designing complex Interactive Voice Response (IVR) systems. He developed the software from ground up to a matured commercial product. It has received outstanding response from developers all around the globe. WinIVR is currently being used/trialed by users for:

- Home automation (controlling appliances in homes)
- Hospitals (e.g. Middlemore Hospital in New Zealand)
- Database applications (taxi companies)
- Robotics
- Telemarketing
- Phone orders
- Voicemail in homes and small businesses

Hardware Engineering

Keith was involved in building a fully integrated digital taxi system. This system is used in companies like Alert Taxis, Corporate Cabs, Eastern Taxis, South Auckland Taxis, Rotorua Taxis, Regency Cabs, Choice Cabs. Most of the work involved hardware design and assembly language, focusing mainly of data communications protocols.

Summary of skills attained:

- Integrated system was based on a "Modular" scheme, where multiple microprocessors (peripherals) are controlled by a central processing unit.
- Developed custom network protocol (data rate 230 kbps) similar to CAN Bus system
- Integrated system with Tait RT radios
- Integrated system with multiple serial inputs (eg Swipe Card reader, Printer, GPS unit) and transmit information to PC via serial port

Summary of skills attained:

Cryptography - digital signatures, encryption/decryption (RSA, MD5, Elliptic Curve, DES)

Multimedia - low level Windows Multimedia APIs, voice compression

Inter Communication Process (IPC) - file mapping, semaphores, mutexes, file locking

Database - single tier multi-user database concepts

Automation - threads and timers

Installation and Deployment - registration techniques (shareware), CD distribution

ActiveX, COM, OLE

Product Maintenance - version upgrades and automatic backups

Programming Concepts - Object Oriented Programming (OOP) and Design (OOD) concepts

Internet – automatic Email retrieval (SMTP)

Modems - serial port, AT Commands

Microsoft Protocols - Telephony API (TAPI), Speech API (SAPI), Messaging API (MAPI)

Management Skills - Internet marketing, sales strategy, web design and e-commerce

MS Access Database

Author of Old Orders Database. Taxi companies use this software to generate management and accounting reports. It was fully coded in Visual Basic. Database skills attained:

- Multi-user file locking
- Database security
- SQL statements
- Version upgrades
- Auto archive, backups
- Accounts transactions and reports

Summer job at Fisher & Paykel (1996)

Involved in microprocessor development, electrical and electronic assembly, engineering design and project management. I was recruited for the P42 Refrigerator Project Team. This team is one of three teams involved in the development and launching of the first digitally controlled refrigerator by Fisher & Paykel.

OTHER INTERESTS

Zepto (2017 – present)

Founder & Managing Director

Keith was involved with developing a fully automated algorithmic trading platform that consist of a cluster of trading robots executing a proprietary forex trading strategy. The core trading algorithm was developed by Keith and is optimized for intraday trading. It has executed over tens of thousands of trades since its inception and continues to generate good ROI per annum. The robots are fully managed and controlled by a central command & control server.

Trading Tools: MT4, WinAPI messaging, AWS (EC2, CLI).

Languages: MQL4, C++, C, C#, Java, Android, Oanda fxtrade API, Python.

Messaging: ZeroMQ p2p messaging (front-end clients/dashboard written in MQL4, C#, Java, Android), FIX protocol, Websockets.

Others: Machine Learning (Tensorflow) – neural network, pattern recognition, JWT.

e3solutions Ltd [www.e3solutions.net] (2005 – present)

Founder & Managing Director

e3solutions was established as a software development house focusing on developing intelligent messaging & mapping applications. The company's goal is to produce innovative products that will improve the way people do things and add value either by saving them time or money.

Through private funding, e3solutions has engaged in heavy R&D for the initial months of business operation. As a result, the company has developed its flagship product MapNav (www.mapnav.net).

Based on the flagship product, Keith invented a new business application and filed a provisional patent for the invention. The invention is based on location based advertising, which allows MapNav to function as a multimedia content management and distribution system. This includes content authoring, transcoding, compression of all major video formats. The product was further enhanced to include CCTV surveillance, digital content (eg news & weather), TXT campaign and real-time Bus Stop information. The product is currently running on buses operated by NZBus (www.nzbus.co.nz) in

Auckland, Whangarei and Wellington. Other key stakeholders in this project include Stuff/Fairfax Media (www.stuff.co.nz), NZ Herald (www.nzherald.co.nz), Auckland Transport (www.aucklandtransport.govt.nz) and iSite (www.isitemedia.co.nz). MapNav is also used in train carriages operated by Tranzscenic (www.tranzscenic.co.nz) in Auckland and Christchurch for the TranzAlpine, TranzCoastal and Northern Explorer (formerly known as Overlander) fleets. This project was managed, assembled and commissioned by KiwiRail (www.kiwirail.co.nz). MapNav is also installed in buses in Invercargill.

MapNav is deployed on Linux, and some of the attained skills include:

Kernel Driver Development: Assisted WIFI vendor's engineers to improve their kernel driver, more than 10 critical bugs were identified. In addition to driver code development, other tasks include kernel panic detection, driver stress testing and driver memory leak detection.

Embedded OS: Custom configured Linux for embedded usage, ie fast boot time, custom kernel build, customised Windows Manager, etc.

Other Areas: Proficient in Linux multimedia, covering 3 major aspects: audio, imaging and video. Also highly knowledgeable (at the low level) in Linux networking, X Windows, ACPI, BTTV, software RAID, OpenWRT.

Java Technologies: Struts, Hibernate, SOAP, Swing, Spring, AJAX, JNI, Multi-threading, RMI, JMF, Quartz, EJB, JPA.

The current deployment of MapNav includes more than 85 Linux nodes (mobile units and servers) in Auckland CBD, connected in a heterogeneous network topology of both wireless and wired nodes.

CBG Research Ltd [www.cbg.co.nz] (May 2020 – Mar 2023)

Consultant & Contractor

During the COVID-19 pandemic, Keith helped develop a job/shift management system used by CBG to allocate shifts to New Zealand's COVID-19 contact tracing team (in collaboration with the Ministry of Health). In addition, Keith was also involved in enhancing the face-to-face survey system (for Ministry of Health and Ministry of Justice) to allow surveyors to conduct surveys via online during the pandemic. Keith was also responsible for rewriting an in-house tool to conduct survey planning and performance analysis of surveyors. Lastly, Keith redesigned the survey system for the Ministry of Transport to reduce data capture error rate and improve data flow.

Software development: Node.js, SQL Server, React, Bootstrap, SAS, React Native, C#, ASP.NET, MySQL, Docker, Apache, PHP.

REFEREES

Available upon request