

# Andrew MATTHEWS

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## SUMMARY

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I am an experienced and versatile software engineer and technical leader specializing in fast, scalable and robust cloud-native distributed systems and the use of knowledge graphs and knowledge management.

## EXPERIENCE

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### Principal Engineer

AGL, 2020 - Present  
Melbourne, AU

In November 2020 I joined AGL on the [NEO project](<https://bit.ly/3Mov35v>) the world's largest Virtual Power Plant (VPP). I work on several systems for the project, primarily in the .NET space. I wrote and maintained the ingestion systems to a number of PV and battery vendors including Tesla, LG SolarEdge and Sungrow. I developed key systems in Azure Kubernetes Service (AKS) where they deliver reliability and scalability. The work includes energy dispatch and systems to help stabilise the grid.

Neo is an extremely varied and challenging project, and my work there includes IoT Telemetry Gathering, Full-Stack development in C#, Python and Go, Data Engineering, DevOps, Power Orchestration, and Simulation System. Within Neo, I am the person people take their hard software engineering problems to.

- Developed industrial-scale simulation platform including modeling language compiler and development environment as well as externally hosted APIs using GraphQL and NATS. This allows data scientists to test their arbitrage algorithms, engineers to scale and load test environments prior to deployment, and developers to create end-to-end system simulations to test extended processes within a highly distributed environment.
- Optimised and extended polling systems allowing AGL to bid on the energy market without interruption. Extended platforms to allow fleet growth within time/space constrained market environment.
- Developed new telemetry pipelines for new vendor PV/Battery systems.

**Technologies Used:** C# 9/10/11, Python 3, Go 1.18, .NET 5/6/7/8, Azure Kubernetes Service (AKS), Docker, Azure Functions, Service Bus, Event Hubs, Azure Data Explorer (ADX), Kusto, Terraform, GraphQL, ANTLR4

### Senior Technology Specialist

Telstra, Jan - Sep 2020  
Melbourne, AU

I rejoined the Telstra TLive team for a short project on behalf of Telstra's network engineering team.

Using knowledge graphs I captured the relationships and capabilities of Telstra's networking devices allowing users to quickly find what they need from the millions of systems they monitor.

- Delivered DSL query languages to bridge Prometheus/Victoria Metrics with RDF
- Used graph database technology to optimise the storage of network configurations
- Simplified classification and management using Semantic Web inference
- Designed next generation CMDB system based on Knowledge Graph
- Micro-services allowed tagging and searching of infrastructure
- Simplified search for performance data amongst petabytes of stored data using custom query language (DSL)
- Extended existing telemetry data and dashboards, allowing PromQL query parser to enrich data

**Technologies Used:** RDF, RDFS, OWL, SPARQL, Elixir, Kubernetes/Docker, TypeScript, Prometheus/PromQL, Allegrograph, AnzoGraph

### Senior Software Engineer

SportsBet, 2019 - 2020  
Melbourne, AU

I joined SportsBet to help them enhance the flexibility and intelligence of their underlying data management systems using Knowledge Graph/Semantic Web technology to innovate new User Experiences (UX).

- Proof of Concept knowledge graph based on AWS Neptune and Blazegraph
- Proposed applications of knowledge graph technology in the sporting domain
- Creation of RDF Ontology of Sport generally and Basketball specifically
- Introduced novel graph to POCO bridging techniques
- Extensive documentation and training provided for early adopters
- Integration of RDF graph technology into Event Sourced Streaming Architecture
- Consultation and guidance on further adoption of RDF technology

- Consultation on risk reduction of adopting new technology
- Developed knowledge graph development guidelines

**Technologies Used:** RDF, RDFS, SPARQL, AWS Neptune, Blazegraph, AWS CloudFormation, .NET Core 2.2/3, C# 8, Docker, ASP.NET Core 2/3, Kafka, Avro, Sumo Logic

## Senior Technology Specialist

Telstra, 2018 - 2019  
Melbourne, AU

A series of contracts developing telemetry and big data time-series systems for Telstra's T-Live team. Core technologies and techniques used are also invaluable for modern data streaming and event processing architectures.

- Created streaming time series system to ingest telemetry data from 2 million NBN gateway devices
- Created real time analysis systems supporting engineering and ops teams
- Provided onward data streaming systems allowing (e.g.) ACCC reporting and proactive customer engagement
- Interpretation and analysis of aggregate data for fault resolution teams and device rollouts

**Technologies Used:** Kubernetes/Docker, Nix/NixOS, Kafka, MQTT, Elixir, C#, Python, PostgreSQL and ElasticSearch

## Principal Developer

Liberty Financial, 2017 - 2018  
Melbourne, AU

Liberty Financial is a fintech providing mortgage, motor and personal loans. They follow a very modern agile methodology, with autonomous product teams, domain guilds, pair and mob programming, as well as using lean start-up and design thinking practices.

- Technical leader on 3 guilds: Strategic Engineering, Data Science and Legacy Uplift
- Provided thought leadership by promoting new initiatives for data ecosystems, event sourcing and cloud transformation.
- Simplified and democratised architecture and administration by introducing Infrastructure as Code through Packer, Ansible and Terraform.
- Helped address traditional security weak spots through the introduction of DevSecOps.

**Technologies Used:** C#/.NET (Framework and Core 2), Docker, Kubernetes, Ansible, Packer, Terraform, GitHub, Gitlab, TeamCity, Octopus, Lean Start-up, Pair/Mob Programming, Human-centred Design/Design Thinking

## Technology Architect and Strategist

UniSuper, 2011 - 2017  
Melbourne, AU

My role with UniSuper, a leading Australian industry superannuation fund, was to guide them in the modernization of their software development and design practices. Working closely with senior stakeholders, I gained buy-in to my digital strategy at a critical time when new ATO rules changed the industry.

- Award winning digital transformation strategy
- Re-platformed technology department onto .NET/C#
- Simplified integration through the use of microservices and ESB
- Raised profile and reputation of architecture
- Defined and governed architecture standards
- Broke down silos promoting inclusive approach to architecture governance
- Mentored architects, developers and engineers in modern software practices
- Thought leader for the Solution, Data, Security and Infrastructure architects
- Trained many new recruits on architectural principles, tools and design standards

**Technologies Used:** Technical Leadership, Enterprise Architecture, Governance, Strategy, Digital Transformation, Design, SOA, UML, ArchiMate, Docker, .NET/C#, Java, BizTalk, BPMN, XML/XSD/SOAP

## Application Architect

Premier Technologies, 2008 - 2011  
Melbourne, AU

I joined Premier to redevelop their hosted dialler product. The product I developed was a kind of Skype for contact centres. It provided world-leading performance in a highly competitive market.

- Designed and led development of dialer product
- Delivered highly extensible, scalable, robust and reliable system
- Originated new techniques to boost developer productivity
- Led adoption of more effective QA techniques to develop a superior product
- Hired and ran the dialer development team

- Massively reduced the TCO for the dialer product
- Built sophisticated multi-tenanted cloud deployment system
- Designed and led dev for new VicRoads learner permit booking system

**Technologies Used:** Team Leadership, Application Architecture, SRE, .NET, C#, ASP.NET, Ajax, COMET, MSMQ, SQL Server, Team City

## Consultant

Readify (now Telstra Purple), 2006 - 2008  
Melbourne, AU

I was a consultant providing architectural guidance to early adopters of .NET – this role demanded broad and deep knowledge of both .NET technologies and architectural best practices.

- Developed package holiday booking system for WebJet (<http://www.webjet.com.au>). The complex domain and high performance expectations made this a high visibility project.
- Consulted with Premier Technologies to provide an architecture health assessment of their telephony products. Later joined them full time to completely overhaul their flagship telephony product (an industry leading hosted dialler product).
- Ported TradingPost.com.au to .NET 2.0. This was another high-profile site with complex architectural issues and performance requirements. Introduce significant performance improvements and helped with architectural clean up of site.
- Consulted with Savings and Loans, NSW Police Dept., and Toll. These short duration consultations require a creative mindset since one has to solve problems against the clock.
- Developed account provisioning system for Queensland Education Dept. This was a part of the largest LDAP/AD transformation projects in the southern hemisphere. Andrew built the web front end to the account provisioning system.

## Chief Architect

LinkMe, Jan - Jun 2006  
Melbourne, AU

LinkMe was a start-up that aimed to differentiate within a crowded marketplace by the application of AI and social networking to the candidate or job selection process. I came on board as their chief architect to help set up the software development team and oversee the architecture of the site.

- Hired dev team and set up development process.
- Defined quality standards, change and configuration management.
- Wrote customer survey system allowing market research.
- Developed bulk email system - allowing targeted newsletters and marketing.
- Security troubleshooting - I solved some nasty little problems that were built into ASP.NET
- System deployment and routine maintenance.
- Algorithm design to dramatically speed up social networking systems.

## Software Engineer

Trading Post, Jul - Dec 2005  
Melbourne, AU

I was on the team that produced one of Australia's leading classified ad platforms.

## Solution Architect

Telstra/BigPond, Jan - Jun 2005  
Melbourne, AU

BigPond, the ISP division of Telstra, is the largest ISP in Australia. I joined their Wireless and Online Content Technology Division as lead solution architect for the **BigPond Movie Downloads** project, one of Australia's first streaming video-on-demand services.

- Lead Solution Architect on BigPond Movie Downloads project.
- Definition of high level solutions for project.
- Liaison with external vendors - tracking progress, and defining acceptable solutions for the business.
- Designed single-sign-on solution - provided a seamless experience between BigPond sites.
- Designed spelling suggestion system for searching - advanced linguistically aware system could make suggestions in the case of search misspellings.
- Provided guidance on best-practice in caching architecture.
- Redefined capacity-planning procedures to provide a better guide for provisioning hardware and bandwidth for high-use systems.

## Technical Architect

Avanade, 2004 - 2005  
Melbourne, AU

Working for Avanade, one of the leading architecture consultancies in the world, I was working at LloydsTSB Share Registrar, the largest share registry in the UK. I was part of three man architecture team tasked with developing the core frameworks for a complete re-write of the banks systems on the .NET platform. All together the project team included around 400 people, based in the UK and India.

- Designed and built core system infrastructure - taught design team best practice for enterprise architecture. Provided a fast, robust, simple, scalable, maintainable system using Service Oriented Architecture (SOA) and Aspect Oriented Development.
- Helped devise systems allowing Lloyds to adopt ORM techniques - advanced then, just becoming mainstream now.
- TDD and Agile Evangelist for the project - mentored off-shored development teams on QA and team best practice.
- Helped to design interface with EAI systems (using BizTalk 2004)
- Produced code generation systems using Rational XDE - allowed generation of many internal systems straight from designs, saving time and money.

## Technical Architect

Digitalbrain PLC, 2002 - 2003  
Melbourne, AU

I designed and led development of one of the UK's first Digital City initiatives.

- Produced low level infrastructure for B2B & B2C systems - provided a way for stakeholders to inter-operate.
- Development of multi-platform distributed ORM system - allowed integration of departmental databases and vendor data.
- Developed code generation systems - allowed automation of many vertical systems, saving time and money.
- Integration of GIS systems into novel geographical search systems - very new at the time.
- Developed Virtual Labour Market and Virtual Store-front Systems
- provided a unique object oriented model allowing integration of job boards, training and career development.
- Integration of systems with BEA Aqualogic Portal System (Plumtree)
- Team management and project lead
- Requirements analysis, feasibility studies, & technical design
- Presentation to and liaison with key stakeholders and management

## Web Development Manager

Card Protection Plan, 2001 - 2002  
Melbourne, AU

Designed and lead development of the company's public website (using Java).

- I mentored the team, teaching them to program in Java, and trained them to support the application in production.
- I was responsible for costing the project and selling the proposal to executive stakeholders. I was had a hand in choosing their CMS capabilities.

## Research Officer

Parallel Applications Centre, 1998 - 1999  
Melbourne, AU

R&D on software engineering of real-time systems, evolutionary computing, data compression, and robotics.

- As a researcher at the Parallel Application Centre (now called The IT Innovation Centre) of Southampton University (UK) I was involved in research work for two ESPRIT funded projects, IDAC and RAPIER. On the IDAC project I was responsible for the production of an evolutionary computation system optimizing data compression of acoustic signals from turbine accelerometers, using genetic algorithms.
- On the RAPIER project I helped in the production of software design and development tools for the automotive and aerospace industries. My key contribution lay in devising methodologies to simulate real time systems within the Schlaer-Mellor methodology using Rate Monotonic Scheduling theory. I helped to formulate policies toward knowledge management, and the introduction of UML design best-practice to the organization.

**Technologies Used:** C++, STL, Genetic Algorithms

## Senior Software Engineer

Fairfield Telepathology Ltd, 1996 - 1998  
Melbourne, AU

I led the development of a ground-breaking Telepathology system providing imaging, remote control, video conferencing, satellite communications and image processing.

My initial work at Fairfield lay in productizing their proof of concept for the PathSight telemedicine product to take it to market.

- Introduced object oriented practices increasing flexibility and maintainability of product
- Introduced UML and Design Patterns to better communicate designs and objectives
- Introduced advanced graphics frameworks to boost performance and reliability
- Enhanced video comms, remote control, and focus control

This core work allowed the product to reach its current position as the most successful telepathology system in Europe.

## EDUCATION

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### B.Sc. (hons) Computer Science

University of Brighton, 1992 - 1996  
Brighton, UK

Computer Science degree specializing in Software Engineering, Evolutionary Computing and Language Processing.

- **Thesis:** *Linguistic Development Literature Review*
- **Thesis:** *Evolutionary Grammar Induction* – Unpublished original research applying Genetic Programming to Natural Language Processing and Grammar Induction.

### Knowledge Graphs - Foundations and Applications

FIZ Karlsruhe Institute of Technology, 2023 - 2024  
Karlsruhe, DE

MOOC on symbolic AI, including Ontology Engineering, Knowledge Management and its use in grounding deep learning systems like LLMs.

### DevSecOps

Sense of Security, Jan - Dec 2018  
Melbourne, AU

Workshop introducing the embedding of security and compliance into all aspects of the DevOps development, deployment and provisioning pipeline. Introduction to tools and techniques needed to defend cloud based infrastructure from common exploits.

### Human-Centered Design

LUMA Institute, Jan - Dec 2018  
Melbourne, AU

A course covering the use of human-centered design, otherwise known as design thinking”, for structured innovation and product design.

### Smart Cities

ETH Zurich, Jun - Aug 2017  
Zurich

MOOC on how data and information will impact the design, sustainability and resilience of future cities.

### Artificial Intelligence

University of Columbia, Jan - Jun 2017  
New York, USA

MOOC covering recent advances in AI with practical and theoretical work on designing intelligent agents to solve real-world problems. Topics included deep learning, search, games, machine learning, classification, logic, natural language processing and constraint satisfaction problems.

### HND Software Engineering

University of Brighton, 1990 - 1992  
Brighton, UK

Foundational study of Software Engineering and practical software development and design.

## SKILLS

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**Core Skills:** C#, .NET, Azure, Docker, Kubernetes, IoT

**Everyday Skills:** Cloud Development, Terraform, Queuing (Kafka, NATS, Event Hubs, MQTT, etc), Databases (Azure Data Explorer(ADX), SQL Server, CosmosDB, PostgreSQL, MySQL, Redis), CI/CD, DevOps, TDD, DI/loC, Agile

**Miscellaneous:** Amazon Web Services (AWS), Event Sourcing/CQRS, Strategy, Enterprise Architecture, ArchiMate 3, AI, Knowledge Graphs, Aspect Oriented Programming (AOP), Microservices, Pair/Mob Programming, RDF(S)/OWL/SPARQL, Compiler Development

**Old Stuff (sometimes handy):** C, Prolog, Erlang, Elixir, Ada, Eiffel, Fish Shell, Expect, Awk, Sed, Forth, Logo, Scheme, Eiffel, Python, Go, Prolog, C++, Java, JavaScript, AOP, UML, SOA, Petri Nets, Automata