

# Résumé



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## Dr Chris Thorne

*Chris is Managing Director of VRShed. His personal aim is to raise the world of modelling, visualisation and simulation to a new level of fidelity through his innovations in simulation. He has developed ways of improving scalability, accuracy, the quality and fidelity of motion, interaction and rendering, and the repeatability of physics simulation. This work continues from Chris's PhD in high fidelity simulation, received from The University of Western Australia (UWA). Chris also has a Masters for research in computer graphics from Curtin University.*

*Chris heads a number of virtual world projects: the UWA Second Life Project, UWA Virtual Universe Project, a Web 3D virtual world which includes the campus grounds; and the UWA Google Earth project. He was also technical lead on a virtual classroom project for Curtin University.*

*Chris has presented papers and tutorials at a number of international conferences, including SIGGRAPH, Graphite and Cyberworlds. He lead the UWA team which won the 2007 Google Australia-New Zealand virtual campus competition and started the 3D UWA campus on Google Earth. He is involved in several UWA education and training activities and is honorary Research Associate, School of Physics, UWA.*

*Chris chairs the SIGGRAPH panel meetings on virtual worlds and social networking: MUVEMOOTS. He also created the first 3D interactive digital art installation to be exhibited in the Western Australia Art Gallery, for Art In Bloom 2008. Chris is a long term member of the Web3D Consortium where he chaired the Network Working Group for several years.*

*His earlier commercial experience is in 3D visualisation R&D projects and the design and delivery of complete enterprise systems. His technical skills are in computer science, 3D modelling and the programming of clients, servers and protocols for 3D simulation and virtual worlds.*

*Chris developed the 3D geospatial engine behind the planet-earth.org project and the Rez terrain generation package. He is also experienced in the integration of web services with online 3D applications.*

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## **Bibliography of Publications/Presentations**

- THORNE, C. 2008. Origin-centric techniques for optimising scalability and the fidelity of motion, interaction and rendering, PhD Thesis, University of Western Australia. School of Computer Science and Software Engineering, <http://theses.library.uwa.edu.au/adt-WU2008.0177>, see also <http://www.floatingorigin.com>
- THORNE, C. 200?. Effects of Spatially Dependent Error on Rendering, Interaction and Motion in Simulation Worlds, to be published in *Journal of Ubiquitous Computing and Intelligence: Ubiquitous Computing in Cyberworlds, Issue 2, 200?*. <http://www.floatingorigin.com/pubs/thorne-UBCW.pdf>
- THORNE, C. 2006. Error Minimizing Pipeline for Hi-Fidelity, Scalable Geospatial Simulation, *Proceedings of the International Conference on Cyberworlds 2006*, Lausanne, Switzerland, November 28-29, pp81-88. <http://www.floatingorigin.com/pubs/thorneC-Minimising.pdf>
- THORNE, C. 2005. Using a Floating Origin to Improve Fidelity and Performance of Large, Distributed Virtual Worlds, *Proceedings of the International Conference on Cyberworlds 2005*, Nanyang Technical University, Singapore, 23-25 November, pp. 263-270. <http://www.floatingorigin.com/pubs/thorneC-FloatingOrigin.pdf>
- THORNE, C. 2005. Using a Floating Origin to Improve Fidelity and Performance of Large, Distributed Virtual Worlds, *Proceedings of the 14<sup>th</sup> University of Western Australia School of Computer Science and Software Engineering Research Conference*, Rottneest Island, Western Australia, 20-21 September, 2005
- THORNE, C. 2005. Exploiting an Evolutionary Accident in Web3D Communications to Integrate Application Components, accepted for publication at: *Proceedings of the SIGGRAPH 2005 conference on Web graphics: in conjunction with ACM SIGGRAPH 2005: Web Graphics, Session: 3D*, Conference CD ROM, Los Angeles, CA, 31 July - 4 August. <http://www.floatingorigin.com/pubs/EvolutionaryAccident.pdf>
- THORNE, C. 2004. The Kata of Web3D. *Proceedings of the SIGGRAPH 2004 conference on Web graphics: in conjunction with ACM SIGGRAPH 2004: Web Graphics, Session: 3D*, Conference CD ROM, Los Angeles, CA, 8-12 August. <http://www.floatingorigin.com/pubs/kataWeb3d-abstract.pdf>
- THORNE, C. and HAINES, K. 2004. Gateway and Protocol for Modern Cyberspace. *Proceedings of the SIGGRAPH 2004 conference on Web graphics: in conjunction with ACM SIGGRAPH 2004: Web Graphics, Session: 3D*, Conference CD ROM, Los Angeles, CA, 8-12 August. <http://www.floatingorigin.com/pubs/cybergate-abstract.pdf>
- WEILEY, V. and THORNE, C. 2004. Practical techniques for building cities, landscapes and planets in the Geospatial web, Tutorial, *Graphite 2004 International Conference on Computer Graphics and Interactive Techniques in Australasia and South East Asia*, Singapore, June.
- THORNE, C. and WEILEY, V. 2003. Earth's Avatar: The Web Augmented Virtual Earth (WAVE), *Proceedings of the SIGGRAPH 2003 conference on Web graphics: in conjunction with the 30th annual conference on Computer graphics and interactive techniques*, Conference CD ROM, San Diego, CA, 27-31 July.
- THORNE, C. and WEILEY, V. 2003. The Next Generation of Virtual worlds with VRML, X3D and MPEG4, Tutorial, *Graphite 2003 International Conference on Computer Graphics and Interactive Techniques in Australasia and South East Asia*, Melbourne, Australia, February.

## Grants, Awards, Competitions

Co-recipient of the UWA and Shenton college Aspire 2008 award Co-recipient of the UWA and Shenton college Learning Links award	
Co-recipient of 2007 National Science Week grant Matching funding from School of Computer Science and Software Engineering, UWA	\$1000 \$1500
Co-recipient of 2008 National Science Week grant Matching funding from School of Physics, UWA	\$1000 \$1000
Co winner in a team of 7 of 2007 Google Australia-New Zealand virtual campus competition and put a 3D UWA campus on Google Earth.	Prizes were software, a paid trip to Google HQ Sydney.
Co recipient of various internal university grants for the UWA Virtual Universe Project	Totaling \$147,000
Co recipient of Telstra Broadband Fund 1&2 grants, for the Planet Earth project, 2003-2004	Totaling 350,000

## Panels, Committees, Societies

Chair, Siggraph Multiuser Virtual Environments panel (MUVEMOOT), 2008, 2009

Chair, Web3D Consortium Network Working Group, 2006-2008

## **Personal Details**

<b>Name:</b>	Chris Thorne
<b>Date of Birth:</b>	8 <sup>th</sup> October 1959
<b>Nationality:</b>	Australian
<b>Education/Qualifications:</b>	PhD, School of Computer Science and Software Engineering, The University of Western Australia (2008) MSc, Computer Science, Curtin University of Technology (1994) BSc(Hons) in Computer Science (1980), University of Western Australia
<b>Memberships:</b>	Member of the Association of Virtual Worlds, holds the position of Australian Ambassador. Member of the Web3D Consortium (W3DC) X3D and Geospatial Working Group, chaired the W3DC Network Working Group, participates in the X3D Earth initiative and the specification team for the international X3D standard. Past



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member of Standards Australia IT-031 committee for modeling and simulation standards for a number of years. Association of Computing Machinery, SIGGRAPH, and SIGGRAPH Perth community group.



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## **Employment**

### **June 2008 – present: Managing Director, VRShed PTY LTD**

VRShed provides design, architectural visualisation, virtual worlds content, modelling, simulation and geospatial services. Completed architectural visualisation and Google Earth projects. Completed a Second Life virtual classroom project for Curtin University. Presently working on second stage of UWA Virtual Universe Project. Periodically conduct short 3D modelling courses at UWA for high school students from WA and Singapore.

### **June-August 2008: Digital Artist, 4UMedia**

Created the first 3D interactive digital art installation to be exhibited in the Western Australia Art Gallery for Art In Bloom 2008.

### **February 2004 – 2008: PhD, The University of Western Australia** *35 Stirling Hwy, Crawley, Western Australia*

PhD passed without corrections required. Subject of research was to optimise simulation scalability and the fidelity of motion interaction and rendering. Applies throughout continuous, large-scale, distributed virtual environments and also to very small scale simulation and physics simulation. Scholarship was provided by a Western Australian Premier's Collaborative Research Project (PCRP) grant for the development of a concept demonstrator that supports industrial accident reconstruction and safety planning and training using a distributed virtual environment - a collaboration between the University of Western Australia, the Australian CSIRO and the Department of Industry and Resources. Chris's work has contributed insights into ways to improve the accuracy of data recording and processing used by the project for 3D visualisation.

### **September 2002– 2008: Systemic PTY LTD** *200 Hampden Rd, Nedlands, Western Australia*

*Position: Virtual World Architect, Consultant for geospatial and cross media contracts*

Contracted to the Naval Postgraduate School, Monterey, CA, to develop geospatial visualisation for the X3D Earth project using my Rez software tools. Also completed some small general contracts to Thales and Central TAFE.

### **March 2002 – 2008: Technical Director, Ping Interactive Broadband** *200 Hampden Rd, Nedlands, Western Australia*

*Position: Technical Director*

Responsible for developing web services, geospatial services and 3D client visualization for the 3map technology framework and the planet-earth project. During this time I also contracted to University of NSW and NSW Department of Housing to develop a concept demonstrator for a spatial decision support system (SDSS) and City of Sydney, providing a system requirements review for the inception of a virtual city building project.

Ping Interactive Broadband established with partners in Sydney, NSW. The company specialises in developing web services, geospatial services and web3D client visualization. An open source online 3D resource project was initiated: planet-earth (<http://www.planet-earth.org>). This project aims to provide a free online, full-scale 3D map of the earth which is built collaboratively like a Wikipedia and can be searched like a 3D geospatial Google.

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**January 2002 – September 2002: Thales**  
20-22 Stirling Highway, Nedlands, Western Australia

Position: System Architect

**Air87 Project:** Ground Mission Environment (GME) of the Air Reconnaissance Helicopter (ARH), Australian Army

Responsible for the system architecture, specification and concept studies for 3D mission planning and replay component and the geographics component. Responsibilities also included team technical support.

Duties included system network, communications design and system software design. Technical analysis including requirements analysis, Use Case analysis, concept studies and other technical reports. Software development processes were according to MIL-STD 498 Software Development and Documentation. Software design involved the use of UML and design patterns.

During this time Chris also worked on:

- specification of design for a Java3D mission planning and preview for helicopter operations over detailed terrain with built-up area features.
- geographical information handling software specification and development in Java.

**May 2001 – January 2002: Thales**  
20-22 Stirling Highway, Nedlands, Western Australia

Position: System Architect

**Marketing**

Responsible for Marketing technical support, assisting in demonstrator development and the re-architecting of systems to be portable between Windows NT and Solaris. Also continued in part-time role as System Architect for SOCSS. Contributed design, modelling (3DS Max, VRML) and coding (java3D) to a helicopter flight simulator for the successful Air87 project bid.

**1997 – 2001: ADI Limited C4ISR, IS3**  
20-22 Stirling Highway, Nedlands, Western Australia

Position: Engineering Manager

**Special Operations Command Support System (SOCSS)**

Responsible for requirements analysis, system architecture design during the tender and subsequent development projects. The projects provide communications and command support to the Australian Special Forces for counter terrorism and special recovery operations. Chris's secondary responsibilities included R&D support for the Marketing department.

Ongoing project responsibilities included Customer liaison, WAN/LAN network architecture design, installations and configuration. This project consisted of deployable network of notebook computers, servers and graphics workstations running Java, Oracle, Lotus Notes and ESRI ArcView on NT4. Palm applications were also prototyped for this project. In addition to his higher responsibilities Chris also wrote 3D prototype demonstrators, developed terrain models and Java code.



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**June 2000 – February 2001: ADI Limited**  
20-22 Stirling Highway, Nedlands, Western Australia

Position: System Architect

**Queensland Rail Locomotive Allocation System**

Responsible for business needs analysis, requirements analysis, system architecture design during two tender bids and the subsequent development project. Wrote use case analysis (UML), data definition and relational model, XML interface protocol specification. Languages used: Java, XML on NT4.

**1996 – 1997: ADI Limited**  
20-22 Stirling Highway, Nedlands, Western Australia

Position: Senior Software Engineer

**R&D into 3D Flight Path Simulation and 2D Graphical Mission Planning**

As Senior Software Engineer Chris lead a team of 6 SEs in developing a 3D flight path simulator and 2D graphical mission planner which became the precursor to the Special Operations Command Support System. Languages: Java, VRML on NT4.

**1995 – 1996: ADI Limited**  
20-22 Stirling Highway, Nedlands, Western Australia

Position: System Architect  
Air Defence System bid

Provided the technical input to the successful bid for the Head Quarters Air Defence System (HQIADS) for Butterworth Air Base. It has gone through a number of upgrades by ADI. HQIADS is very successful and is still in use by the Five Powers Defence Alliance (Australia, New Zealand, England, Malaysia and Singapore).

**1995 – 1996: ADI Limited**  
20-22 Stirling Highway, Nedlands, Western Australia

Position: Senior Process Engineer and System Architect

**Senior Process Engineer**

Responsible for developing engineering processes within the company as part of raising the company capability maturity level of the SEI capability Maturity Model (CMM). During this time Chris performed system analysis and design on project bids.



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**1989 – 1994:**      **Universal Defence Systems**  
*Brodie Hall Drive, Bentley, Western Australia*

*Position:*              *Software Manager*

**Electronic Warfare Command and Processing Subsystem**

Chris was Software Manager on the Electronic Warfare Command and Processing Subsystem (EWCAPSS), phases 1 and 2. Chris also operated as Project manager in the interim period between phases 1 and 2. Languages: Ada on Sun OS.

**1988 – 1989:**      **Universal Defence Systems**  
*Brodie Hall Drive, Bentley, Western Australia*

*Position:*              *Senior Software Engineer*

Chris worked as senior engineer designing and developing graphics and messaging applications for early ADI command support systems. Languages: Ada on Windows.

**1984– 1988:**      **Aldetec Pty Ltd**  
*20-22 Stirling Highway, Nedlands, Western Australia*

*Position:*              *Software Engineer*

Developed software for a high speed image processing system used to profile the wear on railway lines and detect flaws. Languages: Macro-11 assembler on LSI-11/73 running Unix.

**May-Sept 1984: BP Minerals**

*Position:*              *Consultant*

Developed geochemical analysis software. Results were displayed graphically on a Calcomp 1077 plotter and a TI injet printer. languages: Fortran77 and INFO 4GL on VMS.

**Feb 1982-March 1984: WA Petroleum (WAPET)**

*Position:*              *Consultant*

Maintained pipeline monitoring and control system for the WAPET gas pipeline. The control system was a multi-processor embedded system.

Languages: PLM/80.

**Dec 1980-Feb 1982: Wormald Communications**

*Position:*              *Software Engineer*

Designed and implemented software for a microprocessor remote data acquisition and security network. Developed a point-to-point protocol and data transmission software for sending data and status information via an encrypted radio link. Software: 6809 assembler on OEM hardware and HP 64000 development system.