

# ALLEGRO CL<sup>®</sup> @Work!

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## Naughty Dog Inc. Crash Bandicoot Game System

On a small three-island chain off the southeast coast of Australia, a maniacal scientist has set up his headquarters. Bent on world domination, Dr. Neo Cortex has determined that the only way he can accomplish his goal is to create an army faithful only to him. So, he decides to brainwash the local animals and has selected Crash Bandicoot to be their leader. With the help of Dr. Nitrus Brio, they create two machines — the Evolve-Ray gives the animals superior knowledge and the Cortex Vortex is supposed to make them allegiant only to Dr. Cortex — but it doesn't work right. Instead of being devoted geniuses, the animals become raving lunatics.

What does this have to do with Allegro CL?

Crash Bandicoot is the latest game release from Naughty Dog Software™, Universal City, CA, running on the Sony Playstation™. Naughty Dog used Allegro CL for the character control portions of the game. The character control and AI written in Lisp enabled the development of over 500 different types of game objects, each with uniquely crafted and tuned gameplay and visual characteristics.

According to Naughty Dog co-founder Andy

Gavin, the unique capabilities of Allegro CL's Common Lisp language enabled very fast development and execution of character and object control. Crash is filled with all sorts of creatures and devices constructed in full 3D and interacting with the player in real-time (30 frames per second).

"Lisp was just the best solution for this job," comments Gavin, "With leading-edge game systems like ours, you have to deal with complicated behaviors and real-time action.

**“It's easy to construct a simple dialect which is just as efficient as C, but retains the dynamic and consistent qualities that make Lisp a much more effective expression of one's programming intentions. ”**

*Andy Gavin  
Naughty Dog Co-Founder*

Languages like C are very poor with temporal constructs. C is just very awkward for a project like this. Lisp, on the other hand, is ideal."

As Gavin explains, "With Lisp one can rapidly develop meta constructs for behaviors and combine them in new ways. In addition, Lisp allows the redefinition of the language to easily add new constructs, particularly those needed to deal with time-based behaviors and the layering of actions. Contrary to popular belief there is nothing inherently slow about Lisp. It is easy to construct a simple dialect which is just as efficient as C, but retains the dynamic and consistent qualities that make Lisp a much more effective expression of one's programming intentions."

For the Crash Bandicoot project, Naughty Dog used Allegro CL to create a programming language called "GOOL" (Game Object Oriented Language), which is specifically geared to game development. Using this Allegro CL-based language, the team was able to produce hundreds of different game objects with sophisticated real-time behavior and animation. These behaviors are faster to develop, and more compact than an equivalent C program, allowing for rapid prototyping and experimentation. The result, says Gavin, is "we've got the hottest, most highly regarded new game on THE major gaming platform of the moment."

Naughty Dog has been making computer and video games for more than 10 years. Company founders Andy Gavin and Jason Rubin started writing video games as teenagers, and during college produced several titles for Electronic Arts. In 1993 while Gavin was working on his Ph.D. in Computer Science at MIT, they began a fighting game for the 3DO entitled Way of the Warrior. Its high-quality graphics, sound, artificial intelligence, and music attracted several publishing offers, including one from Universal Interactive Studios. Naughty Dog subsequently signed a three-project deal with Universal Interactive in 1994.

In Boston, Rubin and Gavin met another graduate student in the MIT artificial intelligence Ph.D. program, Dave Baggett, who had also written and sold several games during

high school and college. While Rubin and Gavin finished up Way of the Warrior, Baggett began developing some key new graphics technology in a game prototype for Naughty Dog. He and Gavin subsequently refined this technology in Crash Bandicoot, producing the unique 3D treatment and startling high-resolution look that sets the highly-touted Sony PlayStation game apart from other 32- and 64-bit titles.

In mid-1994, Rubin and Gavin set up shop at Universal Interactive in Los Angeles and started assembling the Crash Bandicoot team in early 1995. Gradually, the group expanded to include executive producer Mark Cerny from Universal Interactive and the eight talented young professionals who turned out the groundbreaking platform game in little more than a year and a half.

In March, 1996, the Sony Corporation announced an agreement with Universal Interactive Studios for worldwide publishing rights to Crash Bandicoot. Crash, Sony's new mascot, hit the stores September 9th, PlayStation's anniversary.

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## FRANZ INC.

**The Leader in Dynamic Objects™**

1995 University Avenue  
Berkeley, CA 94704 USA  
888-CLOS NOW / 1-510-548-3600  
[info@franz.com](mailto:info@franz.com) / [www.franz.com](http://www.franz.com)