IBM
Sony Corporation
Sony Computer Entertainment Inc.

Linux™ Extensions, Key Software Development Tools
Released for Cell Broadband Engine™ Microprocessor

New Cell Broadband Engine^{TM} Software Development Kit Offers Programmers
Open Access to Broad Array of Components, Services, Resources

Armonk, NY, November 9, 2005 – IBM, Sony Corporation and Sony Computer Entertainment Inc., (Sony and SCEI together referred to as "Sony Group") today announced the release of new software components and documentation achieved through the STI joint project - including extensions to Linux ™ that support Cell programming - for the groundbreaking Cell Broadband Engine^{TM} Architecture (CBEA) technology. These resources are jointly located on developerWorks (http://www.ibm.com/developerworks/power/cell/), IBM's forum for developers and the University of Barcelona Supercomputing Center (http://www.bsc.es/projects/deepcomputing/linuxoncell/) and will also be published through http://cell.scei.co.jp/ run by SCEI.

"With this software and documentation IBM, along with Sony Group and Toshiba, are providing the means to explore as yet undiscovered uses for the Cell Broadband Engine through developing value-add software applications," said Jim Kahle, IBM Fellow. "Our joint commitment to open and early access to these technologies will continue the growth of a robust programming community able to fully exploit the amazing capabilities of the Cell Broadband Engine Architecture."
The following Linux operating system, compilers, and utilities are now available that provide software fundamental infrastructure for the Cell Broadband Engine (CBE) microprocessor.

- **Linux for CBEA --** IBM is distributing source patches for the Linux operating system that provide services needed to support the hardware facilities of the CBE microprocessor. These Linux operating system patches include the run-time programming interfaces needed to manage and utilize the Cell's Synergistic Processor Elements (SPEs). The CBE Linux

Reference Implementation Application Binary Interface Specification, V1.0 has been published simultaneously.

- **gcc and binutils for the SPU** -- Distributed by the Sony Group, this code contains the GNU Compiler Collection (gcc) compiler for the Synergistic Processor Unit (SPU) implemented by SCEI, which also supports the standards defined in the SPU C/C++ Language Extensions V2.0, SPU Application Binary Interface Specification V1.3, and Synergistic Processor Unit Instruction Set Architecture V1.0 documents previously released.

The CBE Software Development Kit enables developers to explore the capabilities of the CBEA technology using the following software and documents:

- **IBM Full System Simulator for the Cell Broadband Engine Processor** -- The IBM Full System Simulator executable provides a rich set of capabilities for architecture simulation of the CBE microprocessor. The extensive set of simulation services available are capable of booting and running an operating system as well as applications targeted to the CBE microprocessor. This is the very same simulator used by Sony Group, Toshiba, and IBM to evaluate the architecture design point and prepare a full execution stack for trial runs on the first CBE microprocessor.
- **IBM CBE Software Sample and Library --** This component provides a broad variety of samples and optimized libraries source form that can be utilized by the programming community to better understand how to develop applications for CBE technology. These libraries are being released under an open source license to maximize the value to the programming community. A tutorial and library documentations are also available in the package.
- **IBM XL C Alpha Edition for the Cell Broadband Engine Processor --** This prototype compiler executable is based on IBM's world-class compilation technology for Power Architecture™ providing similar advantages for CBE microprocessors. This compiler supports a tuned implementation for the PPE and SPU of the CBE microprocessor and implements the standards defined in the SPU C/C++ Language Extensions V2.0, SPU

Application Binary Interface Specification V1.3 , and Synergistic Processor Unit Instruction Set Architecture V1.0 documents previously released.

- **Cell Broadband Engine SPE Management Library:** This programming library provides a thread abstraction model on "Linux for CBEA" for application use and management of the Cell Broadband Engine SPEs. This library is being released by IBM under an open source license to maximize the value to the programming community.

"This joint effort by IBM, Toshiba and the Sony Group to build the Cell development infrastructure is an important step into the future," said Masakazu Suzuoki, deputy senior vice president, Semiconductor Development Division, SCEI.   "I believe that it will not only strongly support PlayStation® but consumer electronics business as well."

By opening up a wide set of technical specifications to software developers, Business Partners, academic and research organizations, and potential customers, IBM, Sony Group and Toshiba continue their work to aggressively stimulate the creation of applications for CBEA technology. The goal: establish a thriving community of interest and innovation around the Cell Broadband Engine Architecture technology, allowing all interested parties to rapidly evaluate and utilize the unique capabilities of CBEA technology.

About IBM
IBM develops, manufactures and markets state-of-the-art semiconductor and interconnect technologies, products and services including industry-leading Power Architecture microprocessors. IBM semiconductors are a major contributor to the company's position as the world's largest information   technology company.   Its chip products and solutions power IBM eServer and TotalStorage systems as well as many of the world's best-known electronics brands.
IBM semiconductor innovations include dual-core microprocessors, copper wiring, silicon-on-insulator and silicon germanium transistors, strained silicon, and eFUSE, a technology that enables computer chips to automatically respond to changing conditions.   More information is available at: http://www.ibm.com/chips

About Sony Corporation
Sony Corporation is a leading manufacturer of audio, video, game, communications, key device and information technology products for the consumer and professional markets. With its music, pictures, computer entertainment and on-line businesses, Sony is uniquely positioned to be the leading personal broadband entertainment company in the world.   Sony recorded consolidated annual sales of approximately $67 billion for the fiscal year ended March 31, 2005.   Sony Global Web Site: http://www.sony.net

About Sony Computer Entertainment Inc.
Recognized as the global leader and company responsible for the progression of consumer-based computer entertainment, Sony Computer Entertainment Inc. (SCEI) manufacturers, distributes and markets the PlayStation® game console, the PlayStation®2 computer entertainment system and the PSP™ (PlayStation®Portable) handheld entertainment system.   PlayStation has revolutionized home entertainment by introducing advanced 3D graphic processing, and PlayStation 2 further enhances the PlayStation legacy as the core of home networked entertainment.   PSP is a new portable entertainment system that allows users to enjoy 3D games, with high-quality full-motion video, and high-fidelity stereo audio.   SCEI, along with its subsidiary divisions Sony Computer Entertainment America Inc., Sony Computer Entertainment Europe Ltd., and Sony Computer Entertainment Korea Inc. develops, publishes, markets and distributes software, and manages the third party licensing programs for these platforms in the respective markets worldwide. Headquartered in Tokyo, Japan, Sony Computer Entertainment Inc. is an independent business unit of the Sony Group.

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