



# The IBM PowerAI deep learning frameworks

*(Release 3.4)*

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## Highlights

- Technology preview of distributed deep learning training
  - Includes popular deep learning frameworks available as easy to use pre-built binaries
  - Optimized for the new IBM Power System S822LC for High Performance Computing
  - Provides Convenient installation and upgrades through standard Ubuntu system installer
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Machine learning applications are among the most exciting innovations in IT in this decade. Deep learning is a subset of machine learning based on a programming model where neural networks make sense of data by classifying information based on exemplary training patterns.

This technology can be used for a broad set of purposes. For example, new driver assist technologies rely on machine and deep learning patterns to learn and recognize objects in a rapidly changing environment, personal digital assistant technology is learning to categorize information contained in emails and text messages based on context, and in the enterprise, machine and deep learning applications can be used to identify high-value sales opportunities, provide assistance in call centers, detect instances of intrusion or fraud and suggest solutions to technical or business problems.

The PowerAI Deep Learning Frameworks were created to give developers and data scientists a platform on which to develop new machine learning-based applications and to analyze data with immediate productivity, ease of use, and high performance.

Release 3.4 of the PowerAI Deep Learning Frameworks and supporting libraries consists of some of the most advanced and popular deep



learning frameworks in the research community:

- BVLC Caffe
- NVIDIA Caffe
- IBM Caffe
- TensorFlow
- Torch
- Theano
- Chainer
- OpenBLAS
- NCCL
- NVIDIA DIGITS

The PowerAI Deep Learning Frameworks provide deep learning application developers and scientists an integrated environment that can be easily set up for immediate productivity.

At the same time, the PowerAI Deep Learning Frameworks are updated to include advances in machine learning technology and leading-edge OpenPOWER hardware. This helps to provide investment protection for machine and deep learning applications and a stable, compatible interface validated across future generations of the PowerAI Deep Learning Frameworks and co-optimized IBM OpenPOWER LC hardware platforms.

The PowerAI Deep Learning Frameworks offer easy installation using standard Ubuntu installation processes.

A network based installer is also available for deploying PowerAI to larger clusters.

## Built for High-performance Computing

Application developers can execute their deep learning algorithms either on a POWER central processing unit (CPU) or using a general-purpose graphics processing unit (GPU) accelerator.—a technology pioneered by high performance computing design and deployments.

Accelerators are accessed using device drivers and libraries provided by the accelerator manufacturers. The fourth release of the PowerAI Deep Learning Frameworks is based on the use of Ubuntu 16.04 on IBM® POWER® with NVIDIA CUDA 8 and cuDNN v5.1 packages running on HPC hardware.

## Distributed Deep Learning

PowerAI features groundbreaking new functionality for distributed Deep Learning training.

Most deep learning models have been limited to running on single compute nodes. Alternatively, deep learning users have turned to complicated scaling frameworks or re-engineering/ forking popular open-source frameworks.

Distributed training technology preview is here with TensorFlow in PowerAI R3.4.

Start building larger networks and designing without a ceiling on your model size or imagination. Design for scalability from the start, and you'll be able to rapidly grow in cluster or cloud to meet your desired throughput.

## Hardware platform description and ordering information

The PowerAI Deep Learning Frameworks are tuned for use with the following hardware configurations:

- IBM Power Systems™ S822LC for High Performance Computing (Model 8335-GTB) with up to four NVLINK attached NVIDIA Tesla P100 GPUs. (<http://www.ibm.com/systems/power/hardware/s822lc-hpc/>)
- IBM Power Systems™ S822LC (Model 8335-GCA and 8335-GTA) with up to two NVIDIA Tesla K80 accelerator cards, offering up to four numeric accelerator devices.

Please contact IBM for help configuring or placing an order.

## Software Download

### Direct Download

PowerAI is distributed as a binary for Ubuntu 16.04 LTS from the following source:

<https://public.dhe.ibm.com/software/server/POWER/Linux/midl/ubuntu/>

### Release Guide

A complete Release Guide with package list, prerequisites, deployment guide, and developer information is available at: <https://developer.ibm.com/linuxonpower/deep-learning-powerai/releases/>



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TensorFlow includes software (BoringSSL) developed by the OpenSSL Project for use in the OpenSSL Toolkit. (<http://www.openssl.org/>)

TensorFlow includes cryptographic software written by Eric Young ([ey@cryptsoft.com](mailto:ey@cryptsoft.com))

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