# Introduction

## Neuromorphic Hardware

### Specialized Processing

### Extremely Low Power

### Great data analytics capability

## New Algorithms

# Demand and Potential

## Exascale computing

### Extreme performance and extreme power

### Transitioning to “Fat Nodes”

#### Titan – Revealed in 2013 has 18,688 CPUs and 18,688 GPUS

##### Uses 8.2 MW of Power!

#### Tianhe-2 has 32,000 CPUs with accelerators

##### Uses 24 MW of Power!

#### Nasa vision report suggests in 2030:

##### New systems with have only 20,000 compute nodes

## Exascale Computing

### Accelerator cards are becoming increasingly important

### GPU, Intel PHI

### Neuromorphic hardware?

#### Low Power

#### Excellent Machine Learning Compute Machines

## Designing the Next Supercomputers

### New technologies are simulated

#### Allows testing of hardware configurations

#### Enables rapid prototyping of systems

## Neuromorphic Hardware Simulation

### Should Allow for Chip Simulation

### Needs to simulate

#### Current hardware design

#### Future and theoretical hardware

# Contributions

## NeMo – An Open Source Neuromorphic Hardware Simulation Model

### Design and implementation

#### Implemented using ROSS

#### Event-Driven

#### Parallel

#### Optimistic Event Scheduling

#### Reverse Computation

### Open Source

### Flexible Hardware Models

### Large Scale Simulation Support

### Potential for new spiking neuron models

#### Will support other Spiking Neural Network models in the future

#### Validated using IBM’s TrueNorth Model