PRODUCT BRIEF

Varium™ C1100 Blockchain Accelerator Card

INTRODUCTION

Blockchain technology has a wide range of applications in supply chain management, healthcare, finance and banking. As the technology is decentralized by design, it is an alternative to the many traditional transactional systems. While blockchain technology provides many benefits: greater transparency, enhanced security, increased efficiency and speed; its algorithms require significant computing capability and entail high energy consumption.

The Xilinx® Varium™ C1100 card is a high-performance FPGA-based compute card designed to accelerate compute-intensive blockchain applications in a cost-optimized manner.

The C1100 card can accelerate Proof of Work (PoW) mining algorithms to deliver a high hash rate at relatively low power and speed-up transaction validation in Proof of Stake (PoS) protocols to improve network performance.

OVERVIEW

The C1100 card is a single slot, full-height, half-length form factor passively-cooled card with a Xilinx Virtex™ UltraScale+ FPGA operating at 75W maximum power limit. Large FPGA resources on the C1100 card allow users to implement a truly parallel computational pipeline to run multiple hashing algorithms in parallel and deliver high performance per watt,

The C1100 card supports PCI Express® (PCIe®) Gen3x16 or dual Gen4x8, contains 8 GB of High-Bandwidth Memory(HBM), and Ethernet networking capability with dual QSFP28 connectors capable of 8 x 25 Gb/s.

The C1100 card is supported by Xilinx's Vitis™ development environment, which enables crypto miners to develop several mining algorithms in high-level programming languages such as C and C++.

VARIUM™ C1100 FEATURES

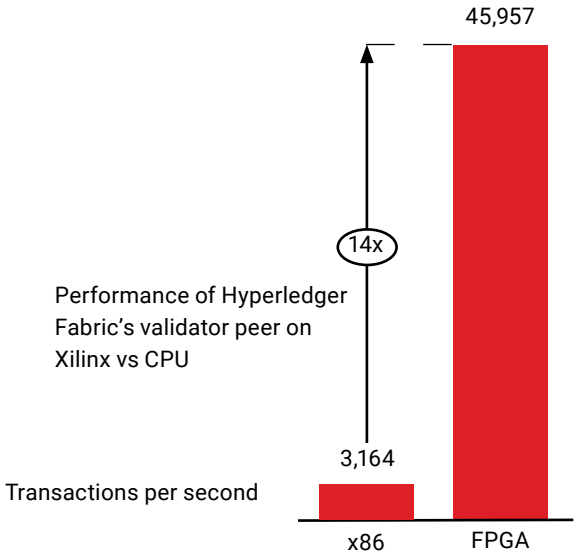
Architecture	Virtex UltraScale+
LUTS	872
Registers	1,743
DSP Slices	5,952
Form Factor	Single Slot, Full Height, Half Length
Micro-USB	Yes
HBM Memory	8 GB
HBM Bandwidth	460 GB/s
Network Interface	2 x QSFP28 ports
PCI Express	PCIe Gen3 x16, PCIe Gen 4x8
Thermal Solution	Passive
Power (TDP)	75W
Tool Support	Vitis and Vivado

Adaptable. Intelligent.

HYPERLEDGER FABRIC ACCELERATION

> A public blockchain does not have restrictions (permissionless). Anyone with an internet connection can get access to the network and start validating blocks and sending transactions. However, companies who adopt blockchain technology to run applications require certain transactional data to be private on the decentralized blockchain network. This private blockchain (permissioned) has restrictions and companies use this as it is fast and provides built-in data integrity.

> Hyperledger Fabric is an open-source permissioned distributed ledger technology (DLT) platform. The Caliper performance benchmark framework allows users to test blockchain solutions with predefined use cases. The smallbank Caliper benchmark simulates bank operations. It intends to provide cross-platform workload for blockchain performance testing in a banking scenario. The Varium C1100 accelerates transaction validation providing 14x more transactions per second compared with an Intel CPU for the smallbank benchmark.



The Varium C1100 card is based on Xilinx UltraScale+. Estimated results are based on Intel Xeon Silver 4114 vs Xilinx UltraScale+ transactions / sec.

DEVELOPMENT ENVIRONMENT

For FPGA-based acceleration, the Vitis™ core development kit lets you build software applications using APIs such as C++ or OpenCL™ APIs to run hardware kernels on accelerator cards such as the Xilinx Varium C1100 card. The card is also programmable using Vivado™.

MICRO USB INTERFACE

A micro-USB interface provides access to the satellite controller for programming as well as system monitoring.

HIGH SPEED NETWORK PORTS

The C1100 card is enabled for high-speed connectivity with two QSFP28 cages, supporting 200Gbps.

REFERENCE DESIGN

An Ethash mining solution based on Vitis is provided which demonstrates how to use HLS to create blockchain acceleration applications and utilize the HBM subsystem in the FPGA.

TEMPERATURE MONITORING

A TI MSP432 satellite controller (SC) resides on the card to control and monitor voltages and temperatures. The host server BMC can interact with the cards through out-of-band communication.

WARRANTY

The C1100 card is warranted for one year when operated as per data sheet specifications.

TAKE THE NEXT STEP

Visit: www.xilinx.com/products/accelerators/varium/c1100

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Printed in the U.S.A. WW9/22/21