Your Innovation
Powered by Xilinx
Developers Like You
Strategy

Data Center First

Accelerate Core Markets

Drive Adaptive Computing
Major Growth Drivers

Data Center

5G

Automotive
Major Growth Drivers

Data Center

5G

Automotive
Platform Transformation – Hardware

Device Category

SW Programmability

- FPGA
- SoC
- MPSoC
- RFSoC
Platform Transformation – Hardware

- SoC
- MPSoC
- RFSoC

Continuing Transformation
Major Growth Drivers

- Data Center
- 5G
- Automotive
Data Center Ecosystem Growth

ISV Ecosystem

Alveo Ecosystem

VARs
Distributors
OEM Partners

FINANCIAL

VIDEO

LIFE SCIENCES

MACHINE LEARNING

ANALYTICS

Customer

5815
Companies and Academia

725
Accelerator Program

85
Published Apps

FPGA as a Service

On-premise

FPGA

Distributors

OEM Partners

VARs

Customer
Data Center Ecosystem Growth

- ISV Ecosystem
- Alveo Ecosystem

- OEM Partners
- VARs
- Distributors

- Customers

- FPGA as a Service

- On-premise

- Distributed

- Cloud

- VIDEO

- LIFE SCIENCES

- FINANCIAL

- ANALYTICS

- MACHINE LEARNING

- VARs
- Distributors
- OEM Partners

5815 Companies and Academia
725 Accelerator Program
85 Published Apps
Xilinx Storage & Network Acceleration

CPU acceleration: 1.5x
Packet processing throughput: 3-6X

Server: Dual Socket Xeon E5-2697 (24 Cores)
Data Plane: ~20 Mpps
# Cores Used: 10

Server + FPGA (VU9P)
Data Plane: ~100 Mpps
# Cores Used: 2

Compute Acceleration

Network

CPU

NIC

PCIe

SSD

Network

CPU

SmartNIC

PCIe

SSD

QUERY PERFORMANCE

Relative Performance

0 1 2 4 6 8 10 12
None 1x 4x 7x 13x

Compute Acceleration

Network

CPU

NIC

PCIe

SSD

Network

CPU

SmartNIC

PCIe

SSD

Compute Acceleration

Network
Future of Data Center: Distributed Adaptive Computing
Disaggregated & Composable

CPUs with SmartNIC
Computational Storage
Compute Accelerators

ACAP
SSD
ACAP
ACAP
Future of Data Center: Distributed Adaptive Computing

Disaggregated & Composable

CPUs with SmartNIC

Computational Storage

Compute Accelerators

Workload 1

Workload 2

Workload 3

Future of Data Center: Distributed Adaptive Computing

Disaggregated & Composable

CPUs with SmartNIC

Computational Storage

Compute Accelerators

Workload 1

Workload 2

Workload 3
Future of Data Center: Distributed Adaptive Computing

Disaggregated & Composable

- CPUs with SmartNIC
- Computational Storage
- Compute Accelerators

Low Total Cost of Ownership
High Performance with Low Latency
Customization & Rapid Innovation without New Silicon
Platform Transformation - Software

- Vivado
- OS & Firmware SDK
- SDSoc, Embedded Applications
- SDAccel, Data Center Platform (FaaS, Alveo)
- AI Inference Acceleration

Device Category

Software Programmability
Introducing Vitis Unified Software Platform
Unified Software Platform

- Heterogeneous
- Edge to Cloud
- Software & AI
Vitis: Unified Software Platform

OpenCV Library  
BLAS Library  
Fintech Library  
AI / ML  
Video Transcoding  
Framework  
Partner  

Compilers  
Analyzers  
Debuggers  

TensorFlow  
FFmpeg  
Vitis: Unified Software Platform
Committed to Open Source

- User Since 2001
- Contributor Since 2007
- Now Core to Xilinx Strategy
Major Growth Drivers

- Data Center
- 5G
- Automotive
Empowering AI Scientists with Vitis AI

Frameworks
- TensorFlow
- Caffe
- PyTorch

Vitis AI Models
- AI Optimizer
- AI Quantizer
- AI Compiler
- AI Profiler

Vitis AI Development Kit
- Runtime Library

DSA
- CNN
- LSTM
- MLP
Empowering the Future
Building the Adaptable, Intelligent World
Introducing the Vitis Unified Software Platform
WELCOME
All Developers
WELCOME
All Developers

LABS
AVAILABLE FOR 20 HOURS

DEMOS
11
18 Xilinx Demos, 39 Partners,
12 Alveo Demos (Partners)

HOURS OF TECHNICAL SESSIONS
IN 6 TRACKS

76

Learn Directly From Experts

XDF 2019
Heterogeneous Compute

Cloud to Edge

AI Proliferation
Heterogeneous Compute

Engines Customized to Accelerate Specific Domains

Key Challenge
Programming & integration of Adaptive Acceleration Engines
Industry Trend: Cloud to Edge

Applications are often split between cloud and edge.

Key Challenge: Need for Retargetability
Industry Trend: AI Proliferation

AI is being used in many applications:
- Smart City
- Smart Retail
- Autonomous Driving
- Security
- Genomics
- Video Analytics
- Healthcare
- Finance

Key Challenge:
Acceleration and Integration of the Whole Application
Heterogeneous Compute

Cloud to Edge

AI Proliferation
Heterogeneous Compute

Cloud to Edge

AI Proliferation
Vitis Unified Software Platform
Enables all Developers to Build and Deploy to All Platforms

Build

Deploy

Embedded Developers
Enterprise Application Developers
Enterprise Infrastructure Developers
Data & AI Scientists

Zynq
Ultrascale
Alveo
Data Center Rack
Build Comprehensive Development Tool Suite
400+ functions across multiple libraries
Open-Source, performance-optimized out-of-the-box acceleration

Domain-Specific Libraries
- Vision & Image
- Finance
- Data Analytics & Database
- Data Compression
- Data Security

Common Libraries
- Math
- Linear Algebra
- Statistics
- DSP
- Data Management
Deploy

Single Server Deployment

Application

Executable

Runtime

XILINX VITIS

Runtime

Executable
Vitis AI: From TensorFlow to Implementation in Minutes

DNN Processing Unit (DPU)
Direct Framework Compilation
Minutes of Compile Times
Enabling AI

- **Frameworks**: TensorFlow, Caffe, PyTorch
- **Vitis AI Models**: AI Optimizer, AI Quantizer, AI Compiler, AI Profiler
- **Vitis AI Development Kit**: Vitis drivers & runtime (XRT)
- **DSA**: CNN DPU, LSTM DPU, MLP DPU

- 30+ pretrained, optimized reference models
- Performance improvement up to 10-20x
- Tensor based ISA for true software programmability
Vitis Enables Whole App Acceleration

Smart City Example
Impact of Whole Application Acceleration

- 7 Channels 1080p
  - Camera IO
  - Pre-Processing
  - Video Decode
  - ML

- 12nm GPU
  - Decode
  - Detect + Classify

- 32 Channels 1080p
  - Camera IO
  - Pre-Processing
  - Video Decode
  - ML

- Versal ACAP
  - Decode
  - Detect + Classify

4.5x throughput
1/6 latency

Source: Xilinx Analysis, GPU = Nvidia T4, DeepStream 4.0 running on T4 in GCP
Launching developer.xilinx.com

- Beta Site Now Available
- Tutorials, Articles & Projects
- Accessible from a Single Location
- Learn Directly from Vitis Experts

30+ expert articles & projects (and growing)
Heterogeneous Compute

Cloud to Edge

AI Proliferation

Heterogeneous
Cloud to Edge
AI Proliferation

VTIIS
Development Platforms for ALL Developers

- Unified
- Open Source Libraries

Free!
Development Platforms for ALL Developers

- Unified
- Open Source Libraries

Free!
Adaptable Intelligence: From RF to the Core
Xilinx Disruptive Technology in 5G

Massive-MIMO Radio
Distributed Unit
Central Unit
CORE NETWORK
Versal Compute Density

Versal Board

VC1902

DFE Subsystem (PL)

CFR

Gain

DPD v10

DDR

5G Data Stream

Memory Controller

Versal Board

XRF2 Board

A/D

Gain

DPD Datapath on AIE

DPD

Datapath on AIE

LO

Spectrum Analyzer

Power Amplifier (PA)

Attenuator

Coupler

FPGA = 8T 8R*
ACAP = 16T 16R*
And 40% lower power

* 200 MHz OBW

And 40% lower power

* 200 MHz OBW

And 40% lower power

* 200 MHz OBW
Take Away
Xilinx Investments Right for 5G

1. AI Engines designs are lower power vs. PL equivalent
2. Wisely partitioning designs between PS, PL and AIE enables higher productivity. Choose the right domain for the job!
3. Excited to unleash more AIE capabilities.
Thank You
Versal is Here...
Now It’s Your Turn – XDF 2019

- 76 Hours of Technical Sessions
- 11 Labs
- 6 Tracks of Technical Sessions
- 69 Demos
  - 18 Xilinx Demos
  - 39 Partners
  - 12 Alveo Demos (Partners)