



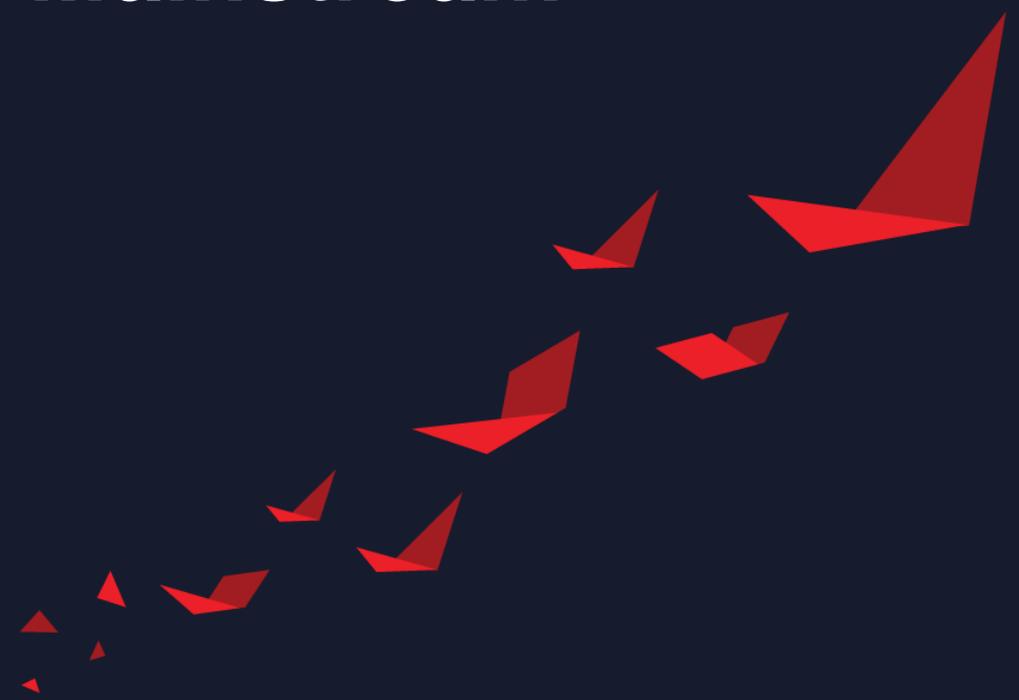
Making Adaptive Computing Mainstream

Ramine Roane

VP Software & AI

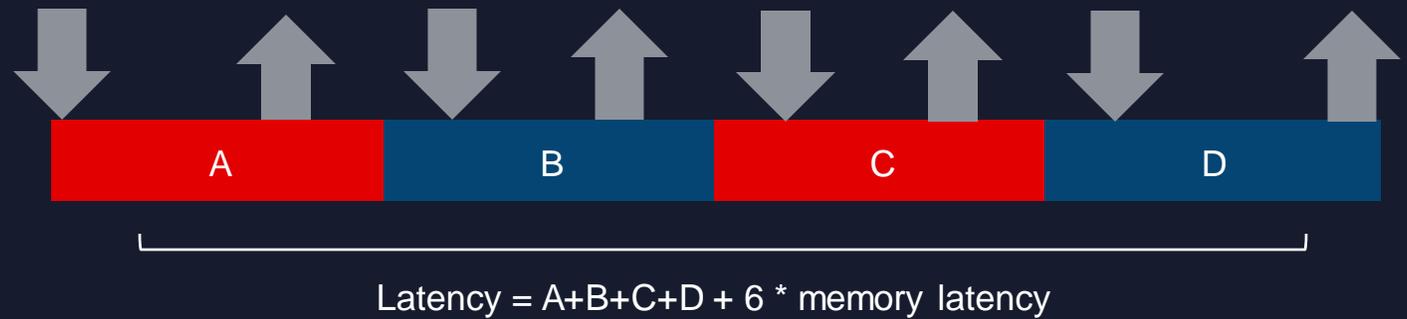
Xilinx Adapt – Software & AI

December, 2020

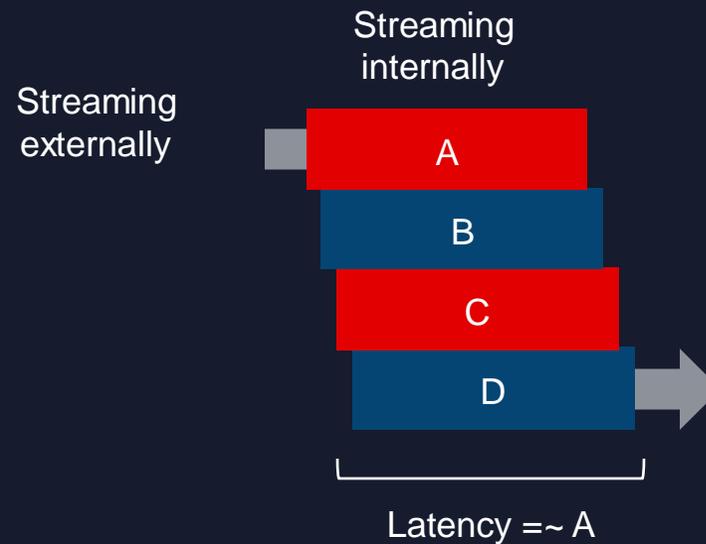


Why Adaptive Computing?

CPU & GPU: Memory Map

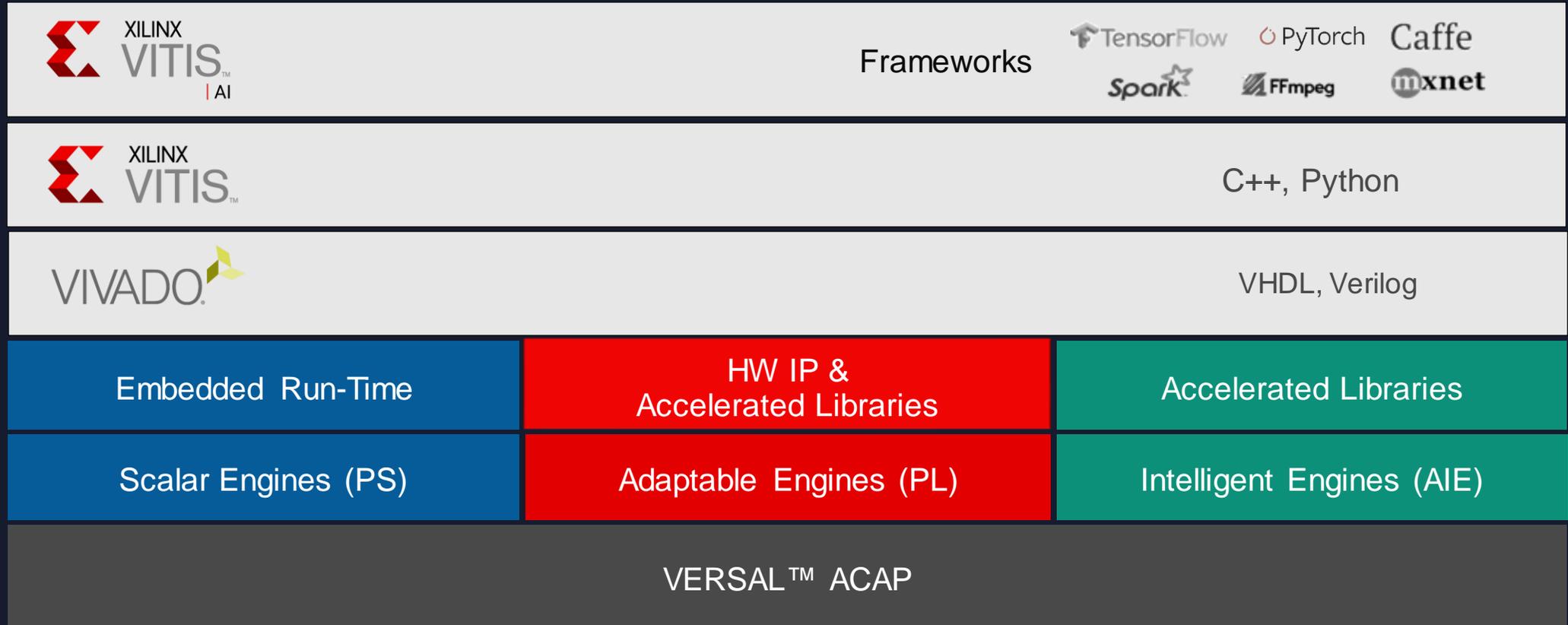


FPGA: Streaming



Development Platforms

-  Data Scientist
-  SW Developer
-  HW Developer



Focusing on Developer Productivity



HW Developer

Iterations: O(day)

- 3x-10x in 5y

SW Developer (HW aware)

Iterations: O(hour)

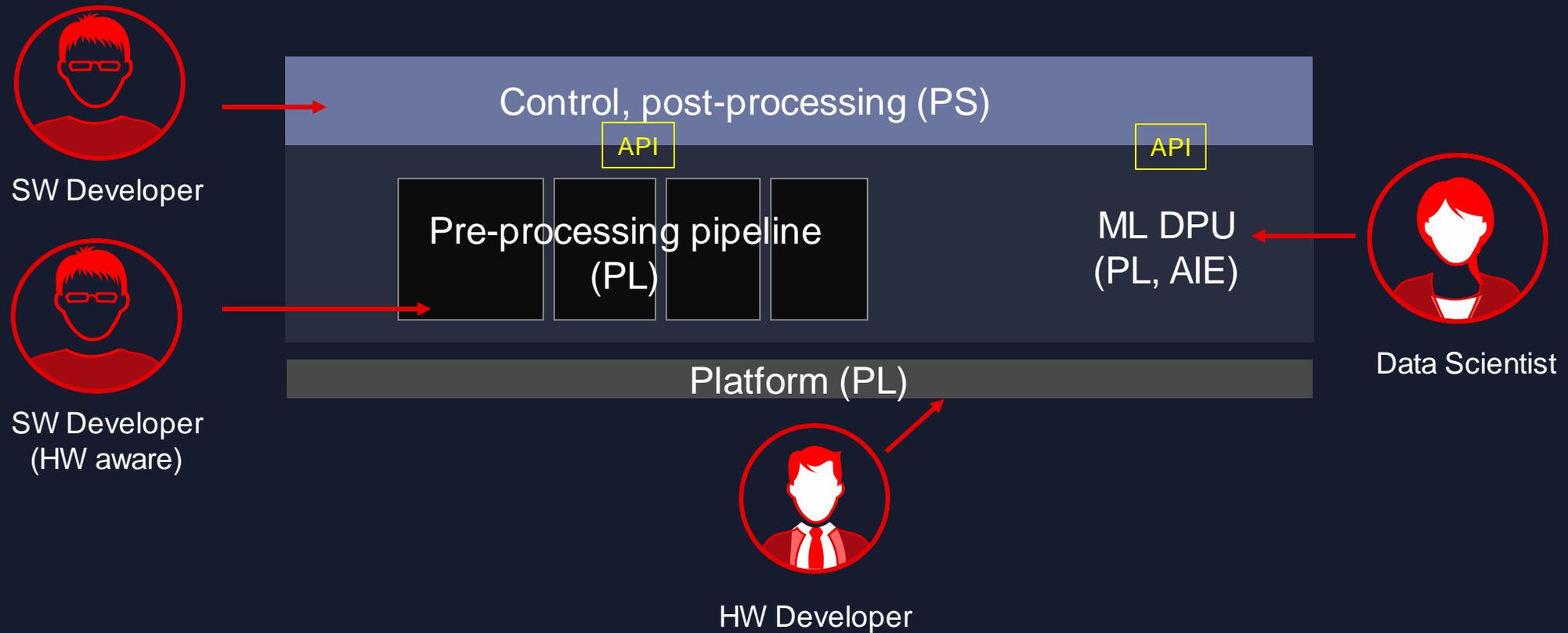
- C++ programming
- Memory hierarchy abstraction
- Pre-compiled libraries

Data Scientist

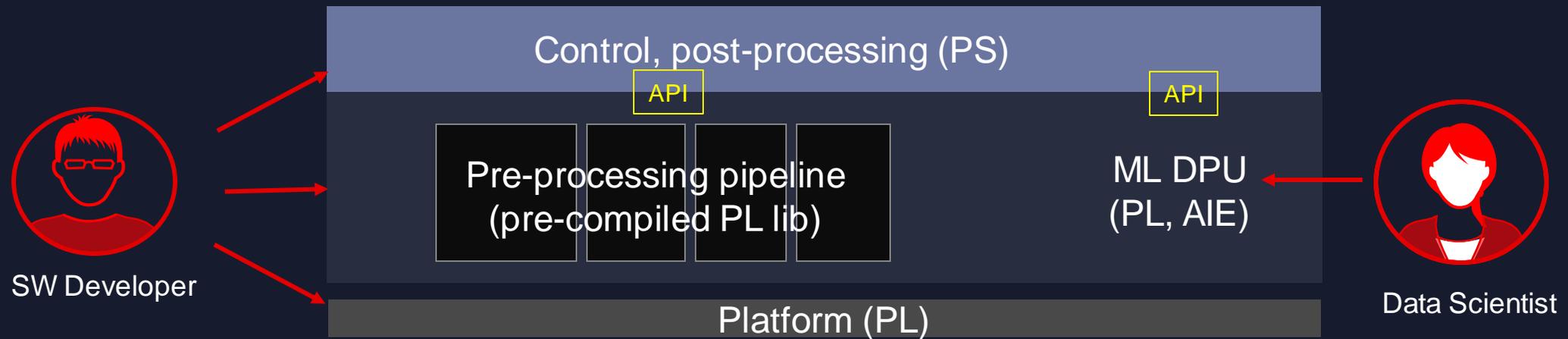
Iterations: O(minute)

- SW Frameworks integration

Software Programmability – Today



Software Programmability – End Goal



Vitis One Year After Launch

Downloads

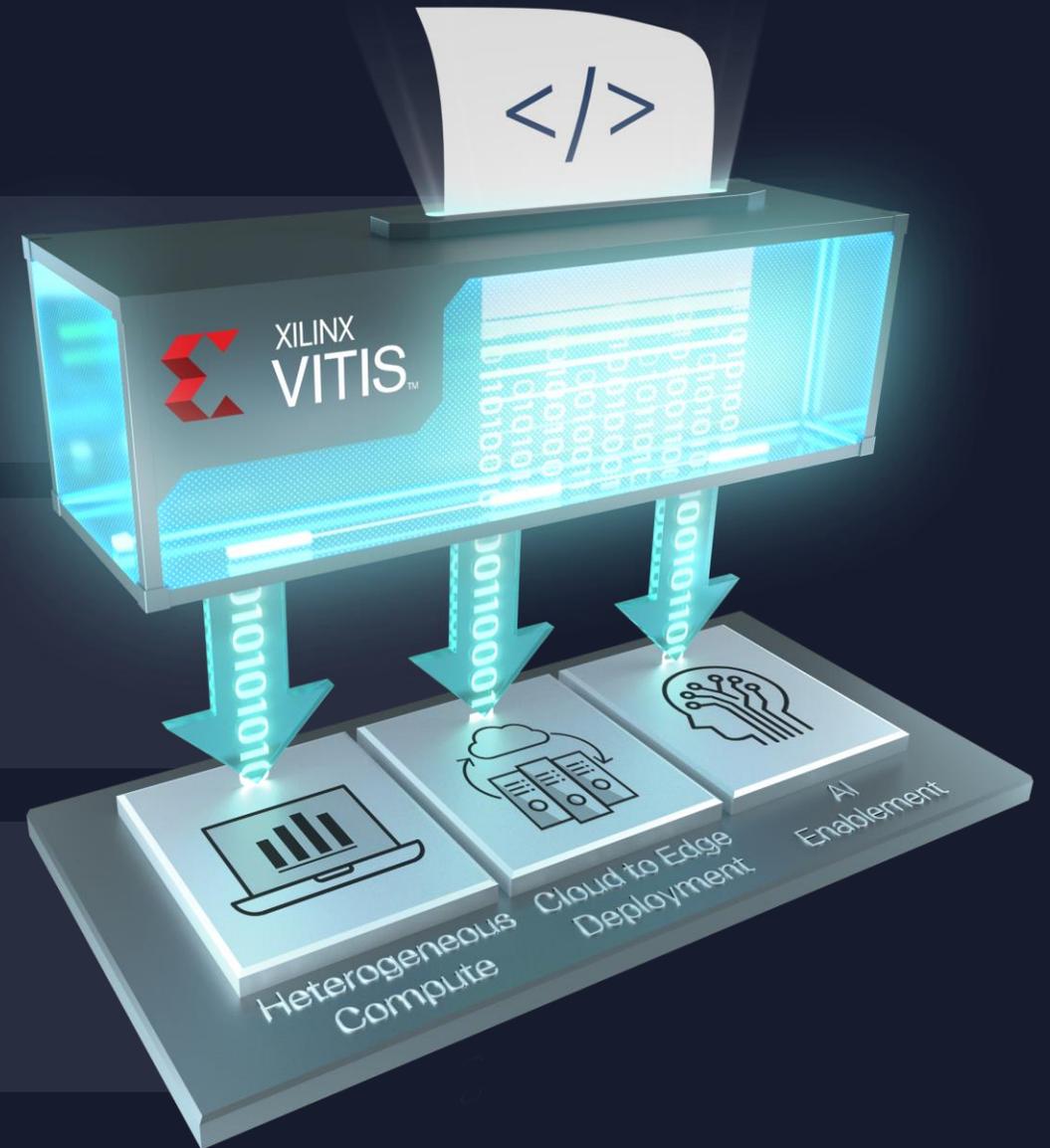
- 47k Vitis
- 40k Vitis AI
- 50% new users

Training

- Trained >15k developers
- 1k ISV

Tutorials

In-depth tutorial for Vitis & Vitis AI on GitHub



Developer Site – developer.xilinx.com

- ▶ The one-stop shop portal for all Xilinx developers
- ▶ in-Depth Tutorials
- ▶ Articles, Projects, Videos
- ▶ Connect developers together

The screenshot displays the Xilinx Developer Site interface. At the top, the XILINX logo is visible. Below it, the page title is "2020.1 Vitis™ - Hardware Accelerators Tutorials". A link points to "See Vitis™ Development Environment on xilinx.com".

The main content area is titled "Introduction to Vitis Hardware Accelerators" and contains a table with two columns: "Tutorial" and "Description".

Tutorial	Description
Introduction to Vitis Hardware Accelerators	This tutorial puts in practice the concepts of FPGA acceleration and illustrates implementation.

Below the table, there are sections for "Design Tutorials" and "Feature Tutorials".

Design Tutorials
The methodology for developing optimized accelerated applications involves architecting the application, and developing the hardware and software for the application architecture by determining which hardware and software components can be achieved, and how to implement them. This involves structuring the source code, and applying kernel architecture needed to achieve the optimization of this methodology in real-world applications.

Tutorial	Description
Bloom Filter Example	This tutorial illustrates the application of Bloom filter techniques.
Convolution Example	This tutorial illustrates the application of 2D convolution techniques.
RTL Systems Integration Example	This tutorial illustrates the application of RTL systems integration techniques.

Feature Tutorials

Tutorial	Description
Getting Started with RTL Kernels	This tutorial illustrates the application of RTL kernels using a Vitis project.
Mixing C and RTL	This tutorial illustrates the application of mixing C and RTL code in a Vitis project.

On the right side of the page, there is a dark banner with the XILINX // DEVELOPER logo and the text "Community, Development, and Application Resources. Keep up with the speed of development".

Below the banner, there is a section titled "Get started. Choose your platform" with a sub-heading "Enjoy a curated repository of resources by platform." This section features three cards for different developer types:

- Software Developers**: Includes a "Get Started | View Product" link.
- AI Developers**: Includes a "Get Started | View Product" link.
- Hardware Developers**: Includes a "Get Started | View Product" link.

At the bottom right, there is a "Developer Program" section with a "Learn More" button. Below that, there is a "Xilinx Community Projects" section with a "View All" link.

Adaptive Computing Challenges – \$250k in Prizes



▶ Developer Contest

1,070 participants registered on hackster.io

▶ **70** countries

▶ Startup Contest

60 Startups registered on xilinx.com

2020 Contest is now closed, watch for the 2021 contest!

Contest Examples

Board	Project
Ultra96-V2	Farmer Assistant Robot
Ultra96-V2	Precision Agriculture System for Small Farmers
Ultra96-V2	Social distancing monitor
Ultra96-V2	Neural Network training on the edge
Ultra96-V2	Object detection for collision avoidance systems in urban env.
Ultra96-V2	Video manipulation on Notebooks
Ultra96-V2	AI Training
Ultra96-V2	Automated Robotic Surveillance & disinfection of contaminated area
Ultra96-V2	CNN based fall detection for elderly homes
Ultra96-V2	Real Time Detection of Suspicious Behavior in Public Spaces
Ultra96-V2	Smart Assistant for patients suffering from Alzheimer's
ZCU104	GLN-based lossless medical image compression/decompression
ZCU104	Adaptive Sensor Fusion for Autonomous Mobile Robots
ZCU104	Smart Traffic Light with Traffic Analytic
ZCU104	Smart Wildlife Observatory, on a Mast
ZCU104	Smarter Fruit Grading with Optical Sensing and BNN
ZCU104	Acceleration of Binary Neural Networks (BNN) using Xilinx FPGAs
ZCU104	Smart Retail
ZCU104	Senior Citizen Monitoring and Alert
Alveo U50	Accelerated LSTM inference for High Frequency Trading (HFT)

...



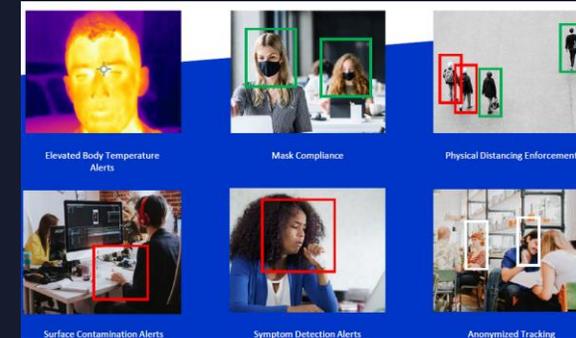
Multi-sensor AD stack (for a Maserati)



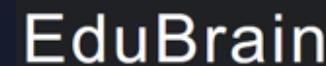
Visual search (face ID)



AI based Predictive Maintenance



Advanced Special Intelligence



AI based Smart Classroom



Vitis Successes



Smart camera: Toll & traffic monitoring, Automatic Number Plate Recognition



- Realtime AI + video compression
- Scalable & high TCO



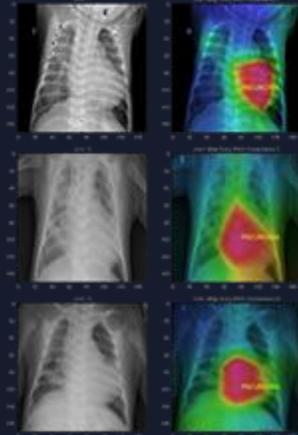
Edge box: Smart building / city Tencent IoT



- Realtime video analytics
- Low-latency transcoding + AI analytics



Edge & Cloud: Pneumonia & covid-19 detection AWS Cloud IoT



- High accuracy, low latency
- Edge to Cloud deployment / Python

Xilinx Achieves Highest AI Inference Efficiency



*Based on MLPerf
benchmarks*



Announcing the Xilinx Software Developer Program

Why Join?

1

Access to
free training
courses
& certification

2

Showcase
your work
on the Xilinx
Developer site

3

Invitations for
developer-only
events &
activities

4

Early access
programs
& release
notifications

Xilinx
Certified
Developer

Free for **all** developers

Developer Program Secure Site

Home / Developer Program Secure Site

Overview Training

Free On-Demand Training Courses for Developers

Accelerating Applications with the Vitis Unified Software Environment

Video Title	Description
Introduction to the Vitis Unified Software Platform	Explains how software/hardware engineers and application developers can be environment and OpenCL framework.
Vitis IDE Tool Overview	Describes the elements of the development flow, such as software emulation, as well as debugging support for the host code and kernel code.
Vitis Command Line Flow	Introduces the Vitis environment makefile flow where the user manages the co
Vitis Accelerated Libraries	Describes the Vitis accelerated libraries that are available for domain-specific are open-source, performance-optimized libraries that offer out-of-the-box acc
Creating a Vitis Embedded Acceleration Platform (Edge)	Describes the Vitis embedded acceleration platform, which provides product d creating embedded software and accelerated applications on heterogeneous p SoCs, and Alveo data center cards.

Developing AI Inference Solutions with the Vitis AI Platform

Video Title	Description
Introduction to the Vitis AI Development Environment	Describes the Vitis AI development environment, which consists of the Vitis AI Xilinx hardware platforms, including both edge devices and Alveo accelerator c
Frameworks Supported by the Vitis AI Development Environment	Discusses the support for many common machine learning frameworks such e
Setting Up the Vitis AI Development Environment	Demonstrates the steps to set up a host machine for developing and running A embedded devices.

Using Xilinx Alveo Cards to Accelerate Dynamic Workloads

Video Title	Description
Using Xilinx Alveo Cards to Accelerate Dynamic Workloads	An overview of the Alveo™ Data Center accelerator cards with an emphasis on Alveo cards using Nimble Cloud and the Vitis™ unified software platform.

Announcing...

Xilinx App Store

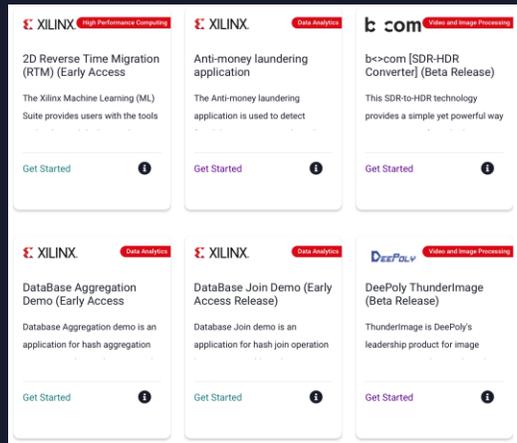
Application for Diversified Markets

[See all Apps](#)

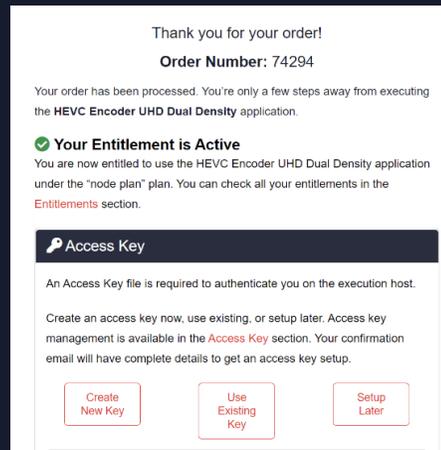


Three-Step, Ten-mins to Evaluation on Alveo or Cloud

Step 1: Select an app

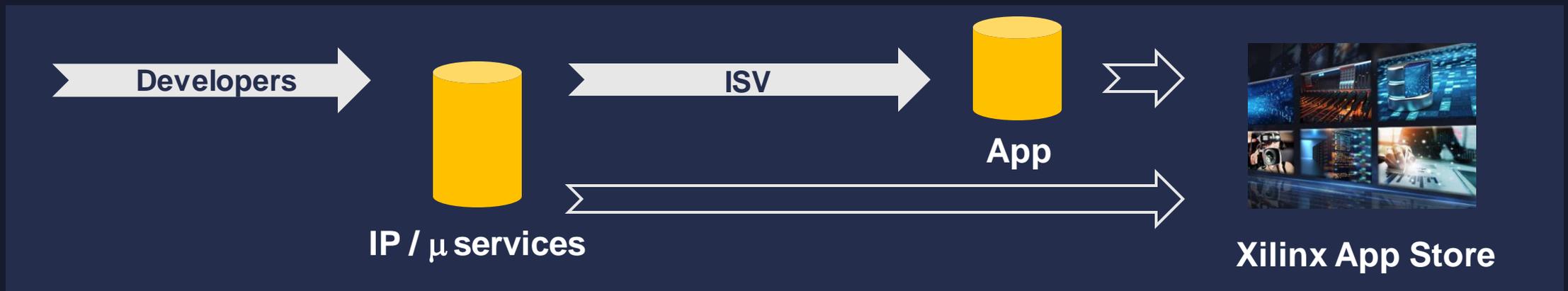
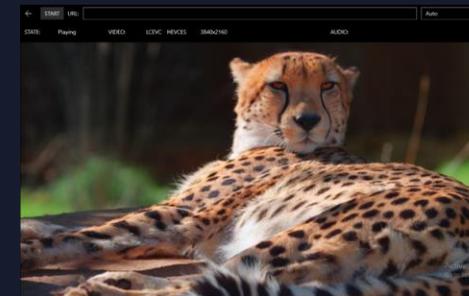


Step 2: Entitlementment



Step 3: Download & Run

```
docker pull hubxilinx/vnova_pplus_alveo_u200:ppxde-demo
docker run -v /tmp/cred.json:/vnova_pplus/cred.json:Z
```



XILINX APP STORE

DELIVERY & DEPLOYMENT

XILINX
APP

ISV
APP



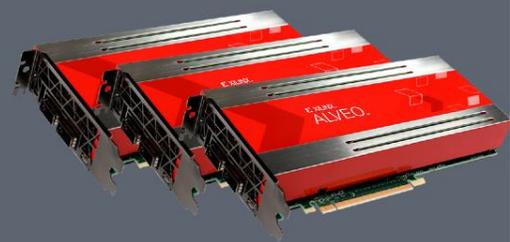
Transcoding	IVA	Life Science	Fintech	Database	Storage	Networking	Telco
APP	APP	APP	APP	APP	APP	APP	APP
APP	APP	APP	APP	APP	APP	APP	APP
APP	APP	APP	APP	APP	APP	APP	APP
APP	APP	APP	APP	APP	APP	APP	APP

STOREFRONT

CHECKOUT - PAYMENT - BILLING - INVOICING

ENTITLEMENTS

DRM - LICENSING - METERING



Making Adaptive Computing Mainstream

- ▶ Visit developer site (developer.xilinx.com)
- ▶ Apply to the Developer program
- ▶ Participate to Adaptive Computing challenges
- ▶ Extensive, in-depth tutorials on GitHub
- ▶ Leverage new Xilinx App Store



Become an Adaptive Computing **Champion** Today!



Thank You

