Data Center Acceleration for Software & AI Developers
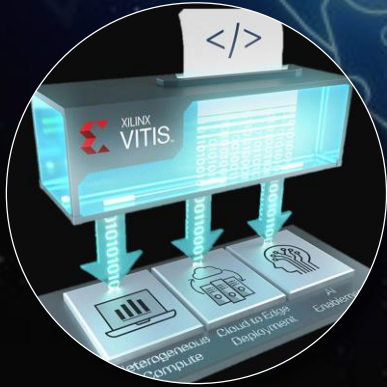
Nick Ni

Director of Product Marketing

AI, Software and Ecosystem

Agenda

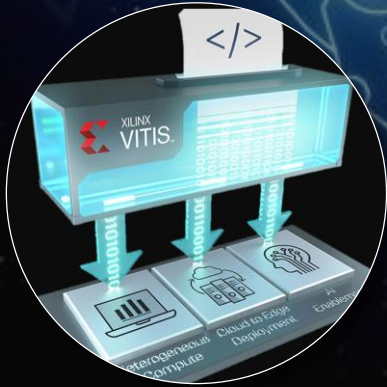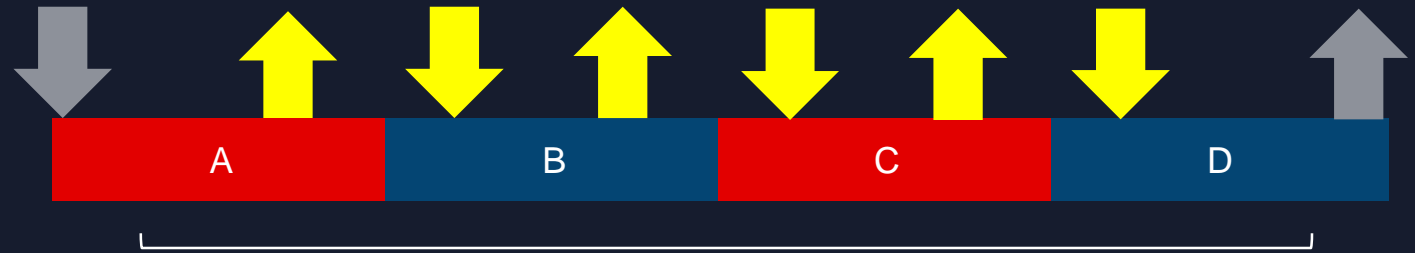**Vitis – Unified Software Platform**

Developer Programs

App Store

Agenda

Vitis – Unified Software Platform

Why Adaptive Computing?

CPU & GPU: Memory Map

A	B	C	D

Latency = A+B+C+D + 6 * memory latency

FPGA: Streaming

A
B
C
D
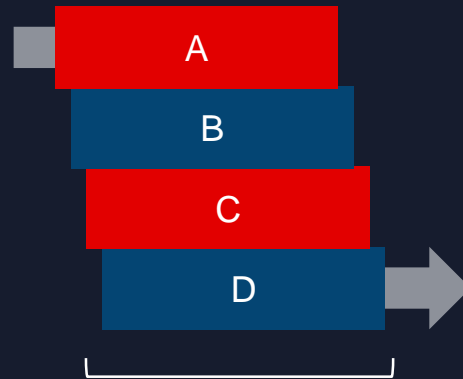
Latency =~ D

▸ **Whole App Acceleration**

▸ **Latency: A << A+B+C+D + 6 * mem**

 XILINX.

Accelerating SW & AI Development w/ HW Abstraction

SW developer	Opensource — Software Application	VS Code / GCC / Linux
AI developer	XILINX VITIS | AI — AI Acceleration	PyTorch / TensorFlow Frameworks
HW-aware dev.	XILINX VITIS — SW Acceleration	C++, Python
Platform dev.	VIVADO — HW / Firmware	VHDL, Verilog

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Achieving Pure Software Programmability Today
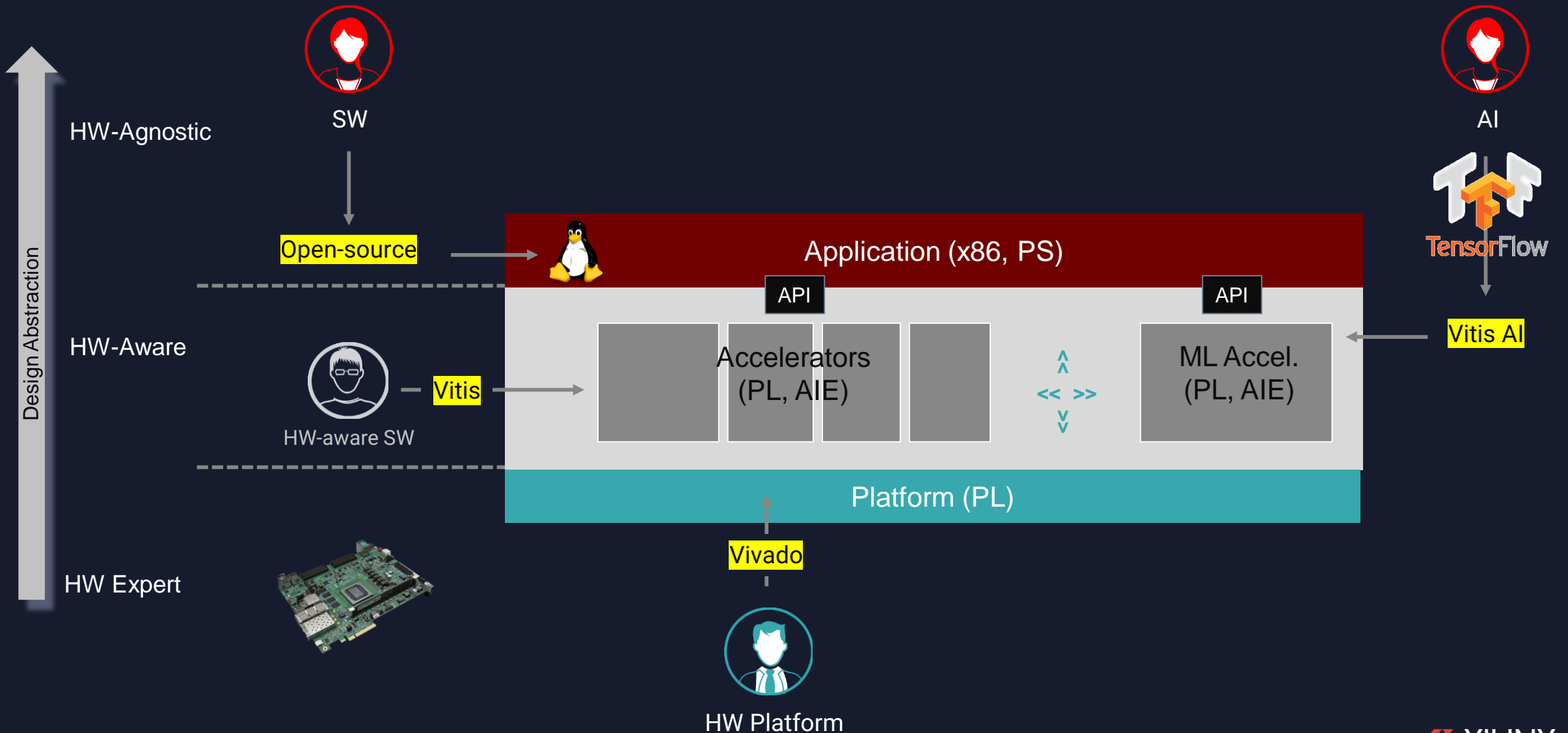
Achieving Application Portability Today

Cloud

Edge

Endpoint

```
cv.cpp                                    Trace

if (is_uyvy) {
    uyvy2bgr (in_mat, in_rgb);
}
else {
    yuyv2bgr (in_mat, in_rgb);
}

resize <INTERPOLATION_AREA,
        MAX_IN_HEIGHT,
        MAX_IN_WIDTH,
        MAX_OUT_HEIGHT,
        MAX_OUT_WIDTH,
        NPC,
        MAX_DOWN_SCALE> (in_r, out_r);
```
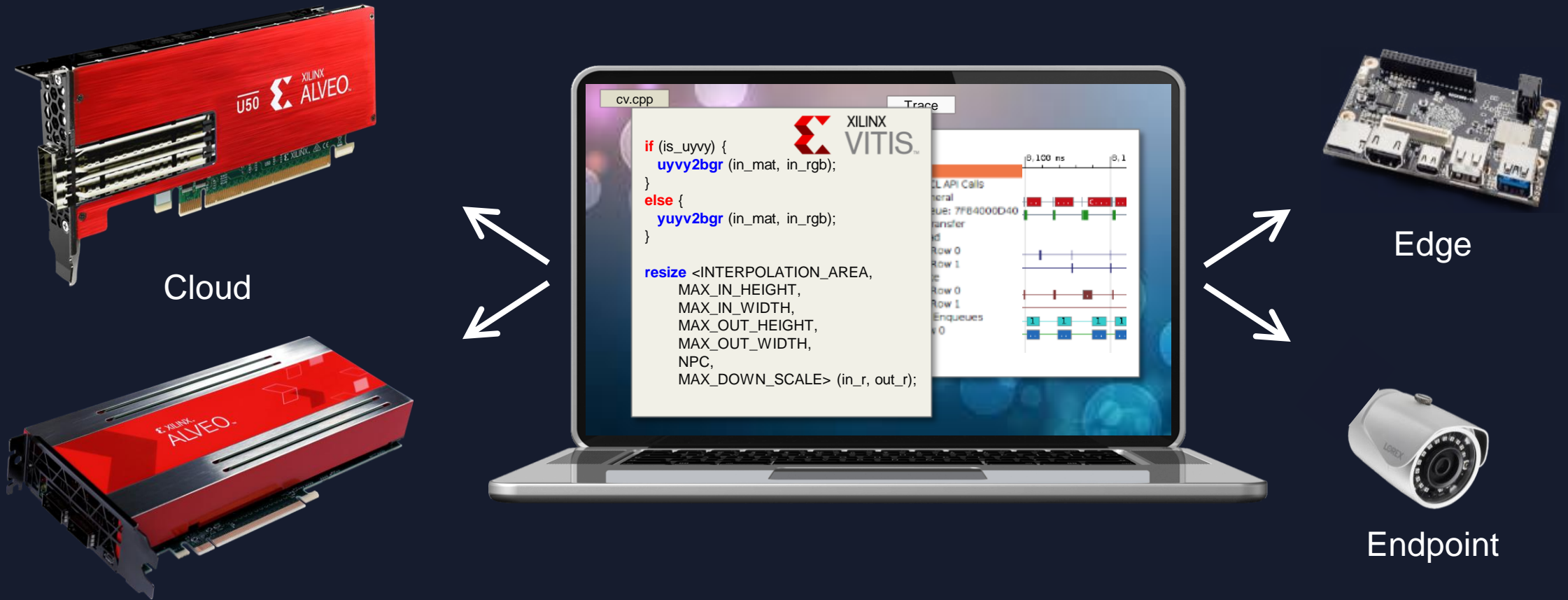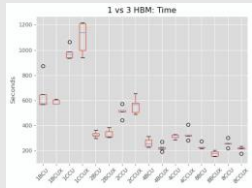
First Adaptive Computing Challenges

▸ Two 6-month events

- **Developers** (on Hackster.io): ended in Dec
- **Startups** porting commercial products; ends in Feb

▸ Developer challenge results:

- **1,070** participants
- **120** free Boards distributed
- **79** successful submission
- **9** winners (3 groups x 3 categories)

Developer Contest Winners

| Adaptable Compute Acceleration (U50)	Intelligent Video Analytics (ZCU104)	Adaptive IoT (U96)
Reinforcement Learning with Binarized NN **New Zealand** — 1st	*Facemask Detector (and Thermal)* **Mexico** — 1st	*Hand-Gesture Controlled Drone* **VT, USA** — 1st
AI-based X-ray Covid detection **Greece** — 2nd	*Automatic Fall Detection for Elderly People* **India** — 2nd	*Real-Time 3D Perception* **Ireland** — 2nd
COVID19 Prediction with Graph **Singapore** — 3rd	*Real-time Smart PoS System* **Taiwan** — 3rd	*Time Series Similarity Prediction* **CA, USA** — 3rd
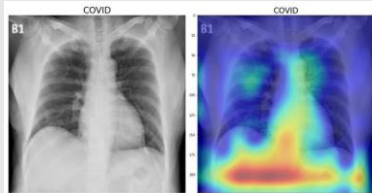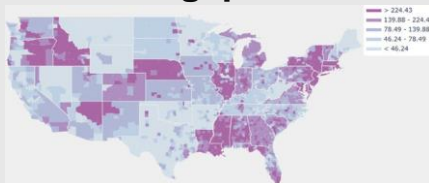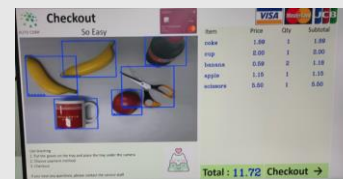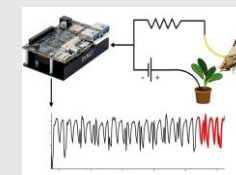
Start-up Contest Submissions

AI-based Super Resolution
Bluedot, Korea

1st
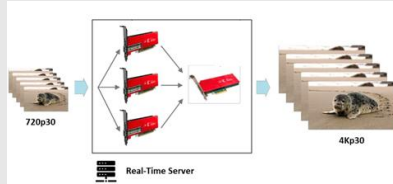
MD simulation for drug discovery
Snowlake, China

2nd
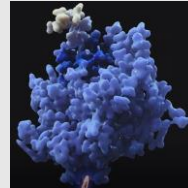
Interactive gaming analytics
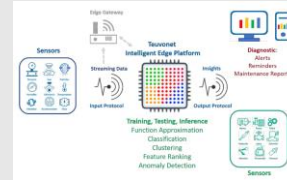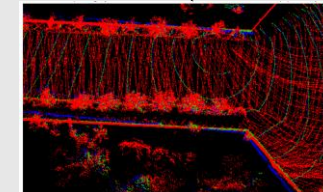**Katoid, Spain**

3rd

Public Health Monitoring
Datavia System, USA

Simplifying AI on the edge
Teuvonet, USA

Point Cloud Registration for Self Driving
Novauto, China

Pentesting Acceleration
Xelera, Germany

Instant Application Acceleration
InAccel, Greece

Privacy-preserving accelerated genomics
CeRICT, Italy

XILINX

Agenda

Developer Programs

Xilinx Programs for Developers and Partners

DC Accelerator Program

For Alveo or cloud solution providers

Alliance Partner Program
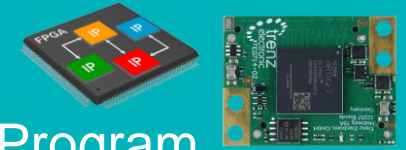
For board, IP and design service providers

Legal Entity ⬆️ ⬇️ Developer   Legal Entity ⬆️ ⬇️ Developer

Xilinx Developer Program

For individual developers

Name: Andy Luo
Reputation Score: 750,000 (top 0.01% overall)

Premier Silver | Premier Gold | Premier Platinum | Premier 1K

Pneumonia and COVID-19 Detection from X-Ray
View Project >

ThunderGP: Fast Graph Processing for HLS-based
View Project >

Vitis-AI 1.2 Flow for Avnet VITIS Platforms
View Project >

XILINX.
On-Demand Training
20+ Courses
Register Now

XILINX. hackster.io
Sign Up for The Adaptive Computing Challenge
Register Today

XILINX.

Announcing the Xilinx Developer Program

Why Join

1	2	3	4
Access to free training courses & certification	Showcase your work on the Xilinx Developer site	Invitations for developer-only events & activities	Early access programs & release notifications

Xilinx Certified Developer

Free for all developers

Developer Program Secure Site

⌂ / Developer Program Secure Site

Overview   Training

Free On-Demand Training Courses for Developers

Accelerating Applications with the Vitis Unified Software Environment

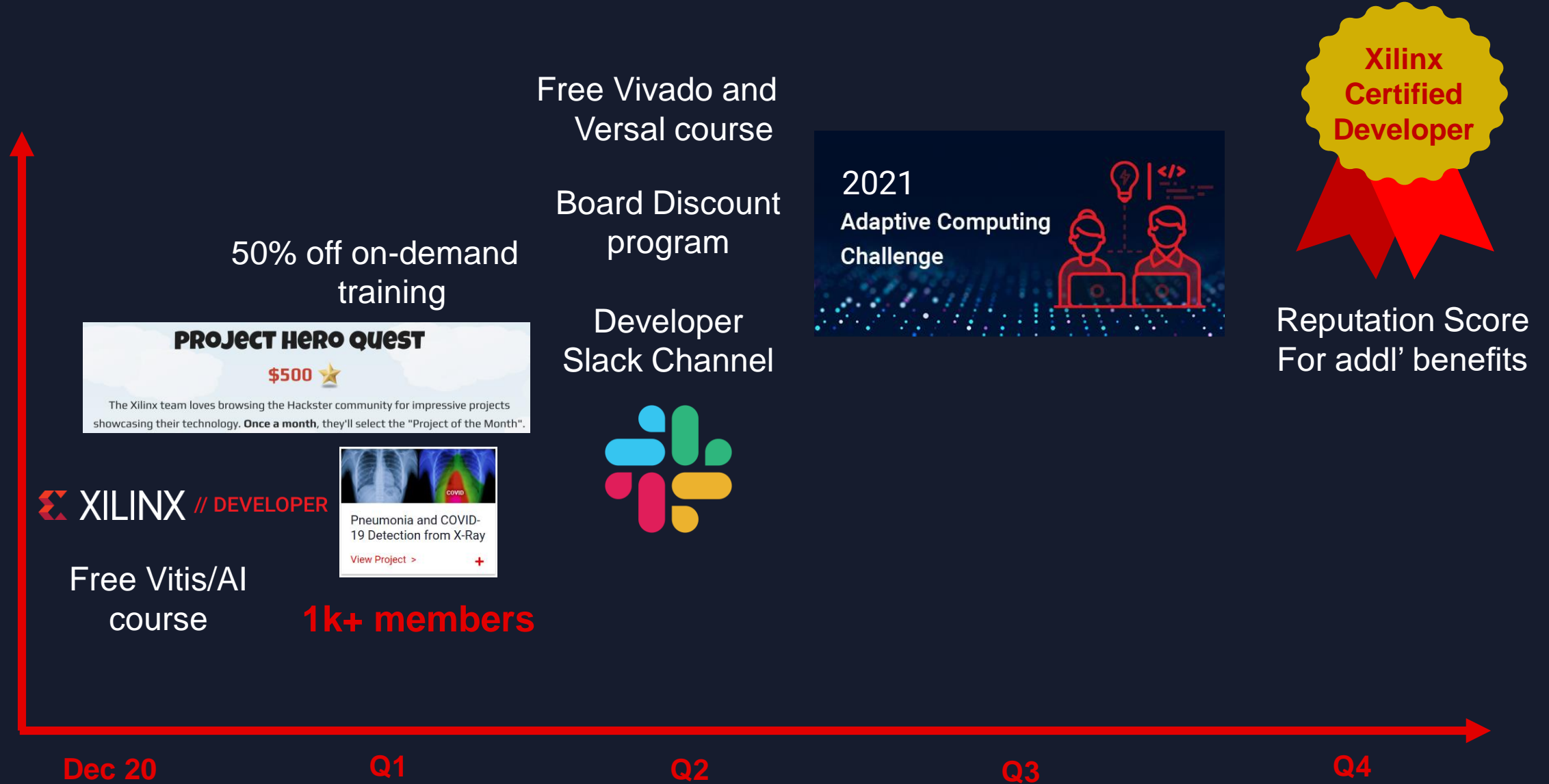| Video Title	Description
Introduction to the Vitis Unified Software Platform	Explains how software/hardware engineers and application developers can be... environment and OpenCL framework.
Vitis IDE Tool Overview	Describes the elements of the development flow, such as software emulation, ... as well 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 a...
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 Nimbix Cloud and the Vitis™ unified software platform.

Developer Program Roadmap

Free Vivado and
Versal course

Board Discount
program

Developer
Slack Channel

2021
Adaptive Computing
Challenge

50% off on-demand
training

PROJECT HERO QUEST

$500 ⭐

The Xilinx team loves browsing the Hackster community for impressive projects
showcasing their technology. **Once a month**, they'll select the "Project of the Month".

XILINX // DEVELOPER

Pneumonia and COVID-
19 Detection from X-Ray

View Project >

Free Vitis/AI
course

1k+ members

**Xilinx
Certified
Developer**

Reputation Score
For addl' benefits

Dec 20   Q1   Q2   Q3   Q4

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Xilinx Adapt Sessions

▶ The largest virtual event with 6000+ live attendees

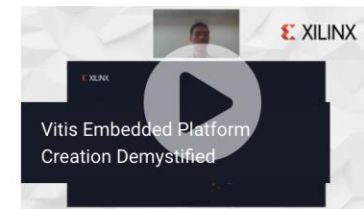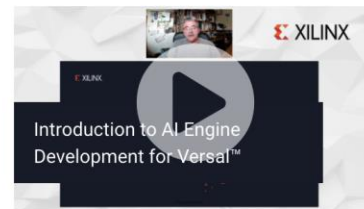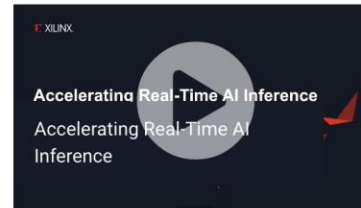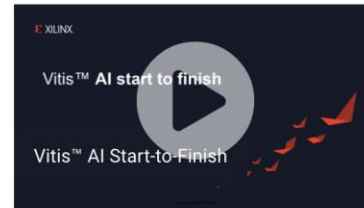▶ Over 20 sessions all available to Developer Program member
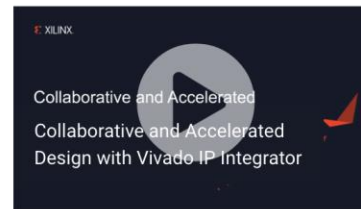
> *"These features will enable the integrated SW/HW engineering teams of the future."*

> *"I am excited how the development is moving to SW based; I'm an embedded developer so this is great!"*

> *"This is revolutionary! So many possible future possibilities for collaboration, mentoring."*

Xilinx Adapt: Software & AI
View On Demand

Xilinx Adapt: Vivado
View On Demand

Xilinx Adapt Technical Session Recordings

Vitis™ and Vitis AI Session Recordings

- Vitis™ AI Start-to-Finish
- Accelerating Real-Time AI Inference
- Once-for-All Network and AutoML Techniques on FPGA
- Xilinx Runtime (XRT) Essentials
- Introduction to AI Engine Development for Versal™
- High-Level Synthesis: From C Code to Hardware Creation
- Vitis System Integration Demo
- Vitis Embedded Platform Creation Demystified

Vivado® Session Recordings

- Getting Started with the Versal™ Architecture
- Collaborative and Accelerated Design with Vivado IP Integrator
- Dynamic Function eXchange
- Model Composer and System Generator Add-on for MATLAB® and Simulink®

Developer Resources

- Developer.Xilinx.com:
  - Developer portal for SW and AI
  - 200+ Articles, projects, videos, trainings, contest

- Self-guided tutorials on GitHub
  - 58 tutorials on AI, software acceleration and Versal
  - 12 AI Engine / Versal optimization

Well done. I found the material very useful and the quality rather high. I'm excited about these tutorials and I believe many share the same vision. Maybe I'll get a chance to contribute in the future myself with some additional tutorials :).

A software developer
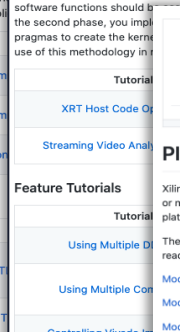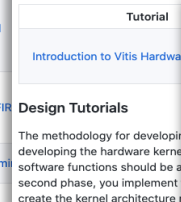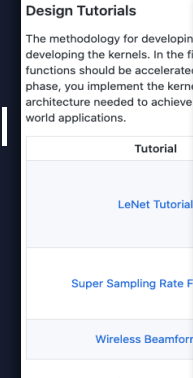
Agenda

App Store

Evaluation & Monetization

The First
Xilinx App Store

Application for Diversified Markets

See all Apps

The One-Stop Shop to Eval and Buy Xilinx Solutions

EXCLUSIVE

▸ **FPGA Apps and IP Cores**

▸ **High quality turnkey solutions**

▸ **Curated by Xilinx experts**

EASY

▸ **Self-service online store**

▸ **Instant free trials**

▸ **Online payment & invoicing**

SCALABLE

▸ **Pay-per-Use**

▸ **Subscriptions**

▸ **Per node, hour, or data volume**

PORTABLE

▸ **Any Xilinx FPGAs anywhere**

▸ **On-prem, cloud, edge, embedded**

▸ **Containerized Apps**

XILINX

Three-Step, Ten-mins to Evaluation on Alveo or Cloud
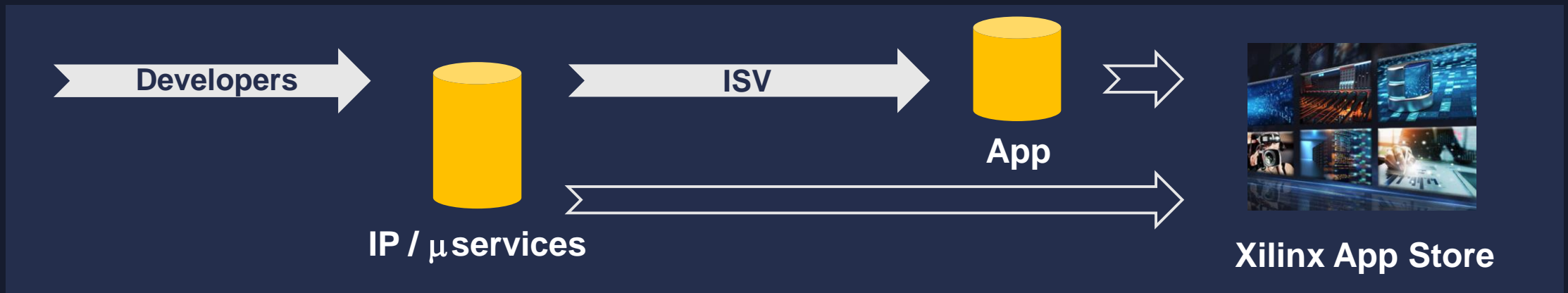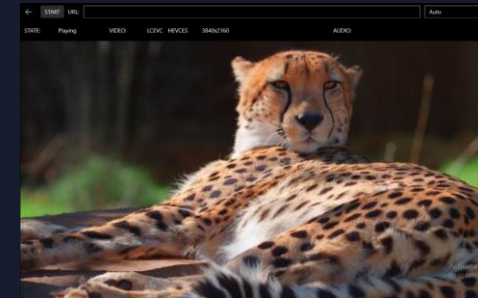
Step 1:

Select an app
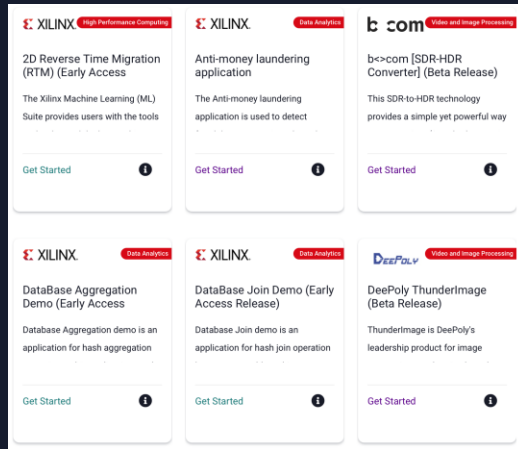
Step 2:

Entitlement
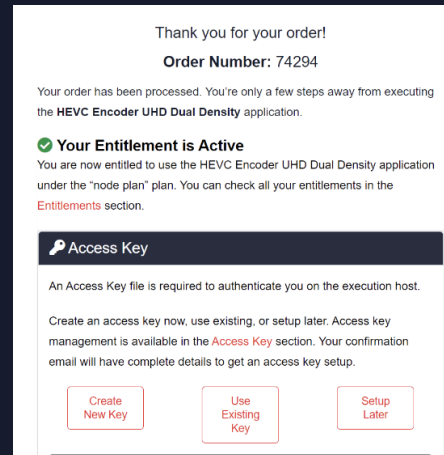
Step 3:

Download & Run


```
docker pull hubxilinx/vnova_pplus_alveo_u200:ppxde-demo

docker run -v /tmp/cred.json:/vnova_pplus/cred.json:Z
```


Developers → **IP / μ services** → **ISV** → **App** → **Xilinx App Store**

LIVE DEMO

Xilinx App Store

Application for Diversified Markets

See all Apps

TRANSCODING

XILINX HEVC/H.265 Bitrate Optimized

XILINX AVC/H.264 Bitrate Optimized

XILINX HEVC/AVC High Density

VIDEO / IMAGE PROCESSING

V-NOVA 4K HEVC/LCEVC Video Encoder

b<>com SDR-HDR Video Converter

DeePoly HEIF Image Encoder

socionext H264 Video Encoder

DATABASE / ANALYTICS

MEGH COMPUTING Video Analytics Solution

Axonerve™ Ultra Fast Search & Replace
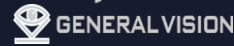
Rapando Big Data Streaming Acceleration

AI/ML

PEAKSPEED Geospatial Orthorectification

Myrtle.ai MAU Accelerator

GENERAL VISION Posit Tensor Processing Unit

STILLWATER SUPERCOMPUTING, INC. Cascadable Cluster for RTML

MOFFETT AI Visual Search Engine

plumerai Mixed Quantization

Aupera Xtream Facial Recognition

Aaware Inc. Acoustically Aware™ Voice Capture for AI Applications

VIVIDSPARKS Posit Processors

EDGECORTIX AI Co-Exploration engine

NETWORKING

LDA TECHNOLOGIES™ 10G 32-bit ULL MAC

MoSys Packet Classification

XIPHERA MACSEC

LIFE SCIENCE

Genetalks GTX Genomics Suite

STORAGE

FALCON COMPUTING Data Compression

bigstream SmartSSD

OTHERS

SEMI BCD HDLC Controller

Logic Truit Technologies ARINC 818

SECURE-IC THE SECURITY SCIENCE COMPANY True RND generator

XILINX

Wrap Up

▶ Vitis enables software and AI developers and adoption going strong

  - Download and start developing today: Xilinx.com/vitis

▶ Developer Program is here to make you successful developing on Xilinx

  - Sign-up today to enjoy perks: developer.Xilinx.com

▶ Xilinx App Store enables 10 min to evaluate Xilinx and ISV applications

  - Evaluate today and sign-up to be a seller: Xilinx.com/appstore

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Xilinx Mission

Building the Adaptable, Intelligent World