Track 1 | Session 3

建構安全高效的電子設計自動化環境

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aws SUMMIT ONLINE

Agenda

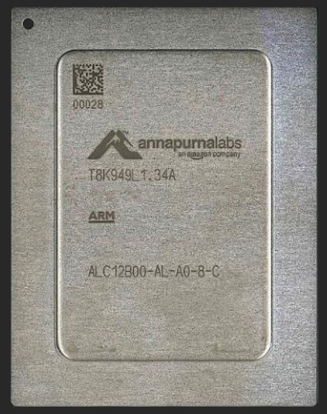
Infrastructure

Compute and Storage

Workload and resource management

Customer story – VIA Technologies

Summary



Amazon is part of the **semiconductor and electronics** industry

We design our own silicon devices, and we source from a global supply chain

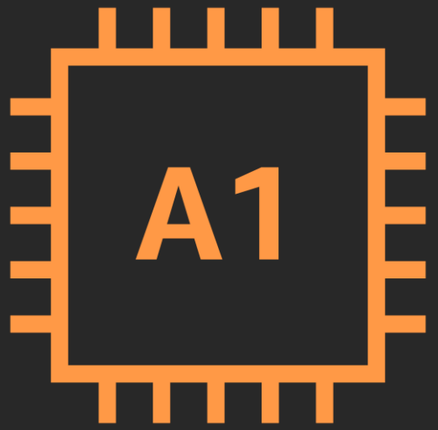
Amazon has multiple, globally distributed silicon teams, for:

- Datacenter infrastructure
- Consumer devices
- Robotics and AI
- And more

We benefit from AWS in our own IC development

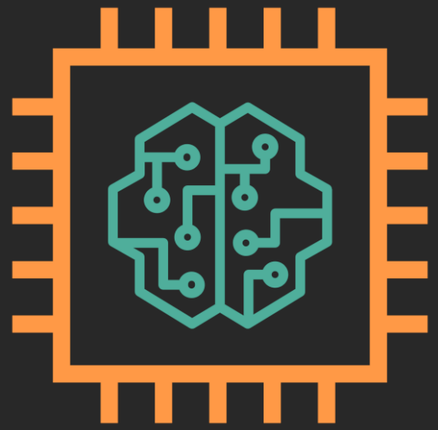
Amazon Silicon

annapurnalabs
an amazon company



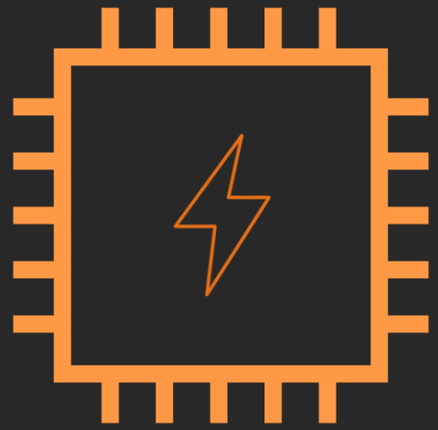
AWS Graviton/2

Powerful and efficient server chip for modern applications



AWS Inferentia

Machine learning hardware and software at scale

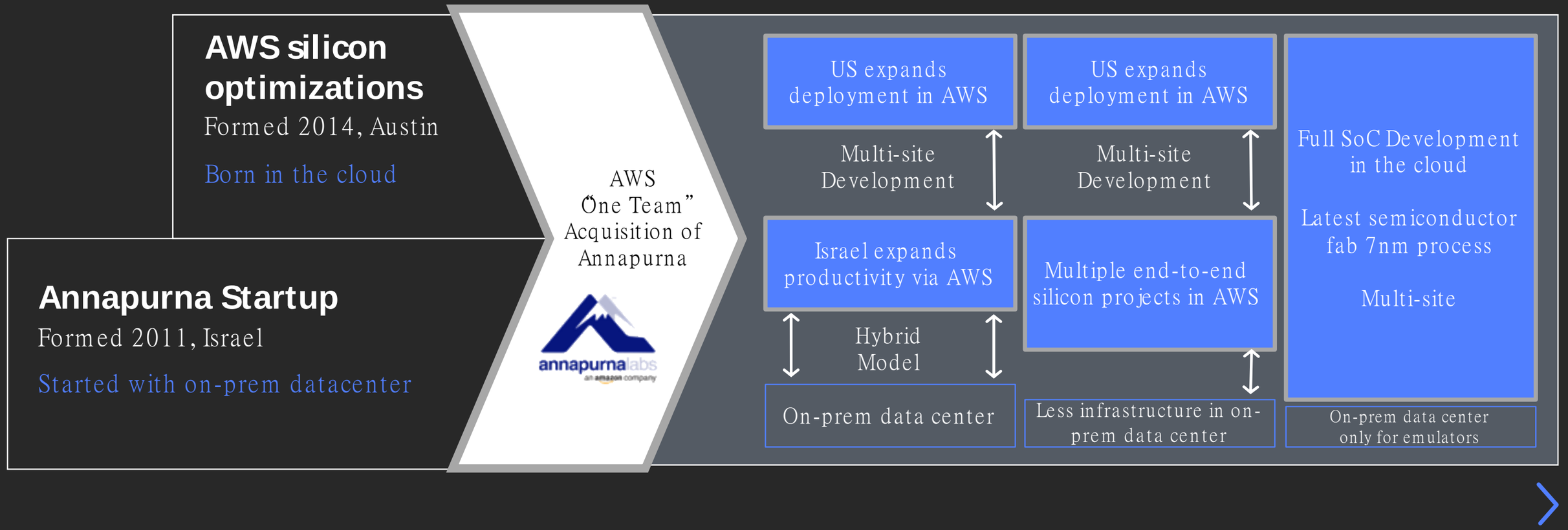


AWS Nitro System

Cloud hypervisor, network, storage, and security

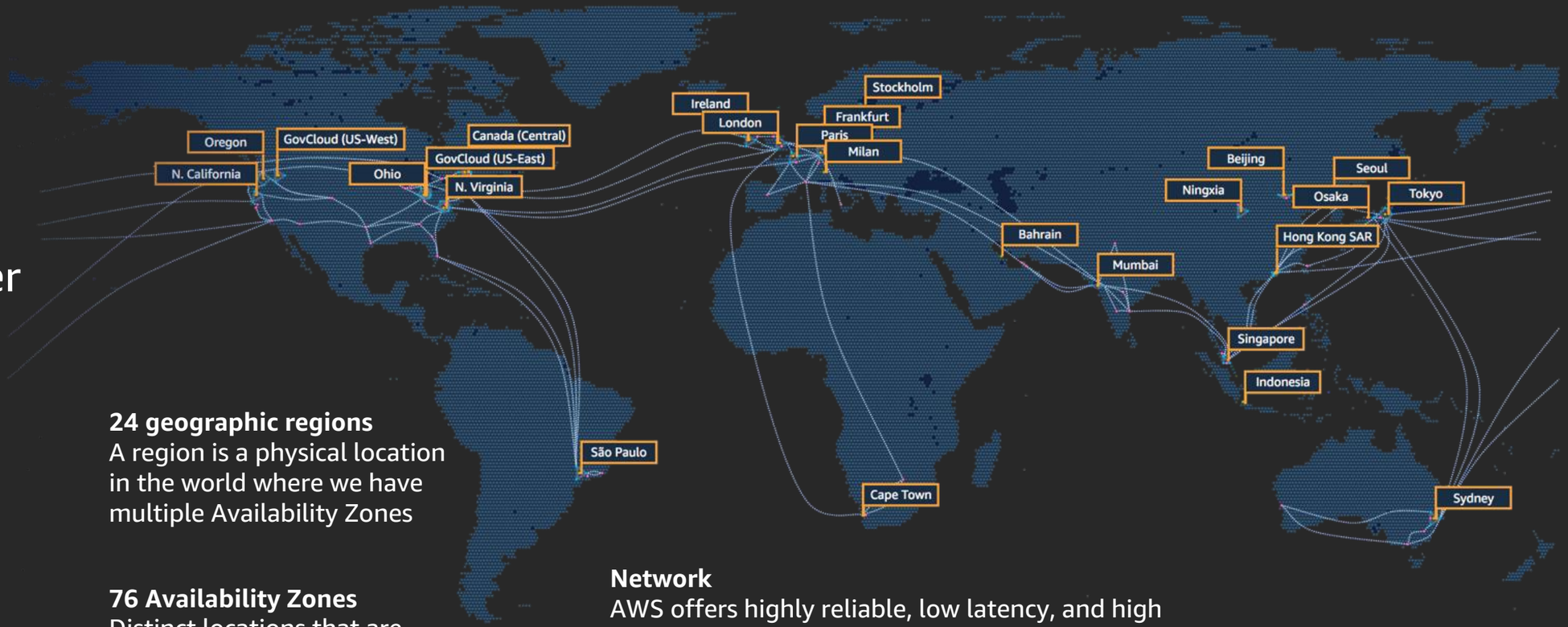
100% Developed in the Cloud: RTL → GDSII

Our own journey—our own digital transformation



Why AWS?

- Innovate faster
- Collaborate better
- Reduce risk
- Reduce cost



24 geographic regions
A region is a physical location in the world where we have multiple Availability Zones

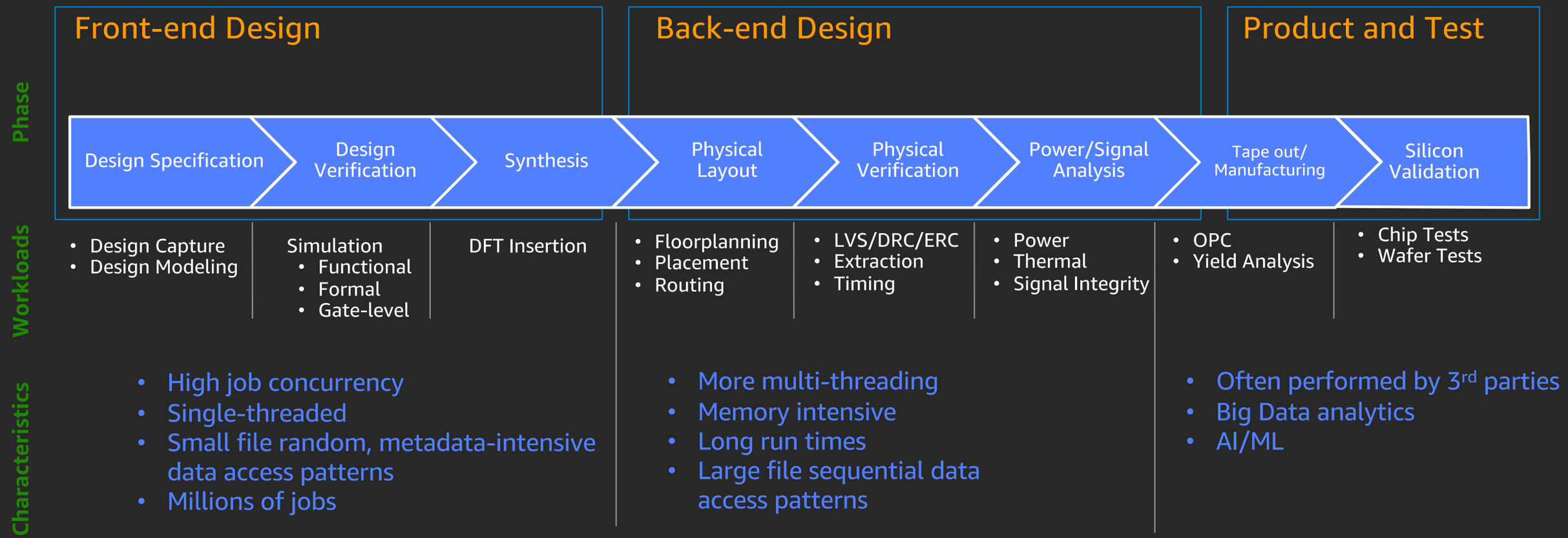
76 Availability Zones
Distinct locations that are engineered to be insulated from failures in other Availability Zones

Network
AWS offers highly reliable, low latency, and high throughput network connectivity. This is achieved with a fully redundant 100 Gbps network that circles the globe.

Why EDA on AWS?

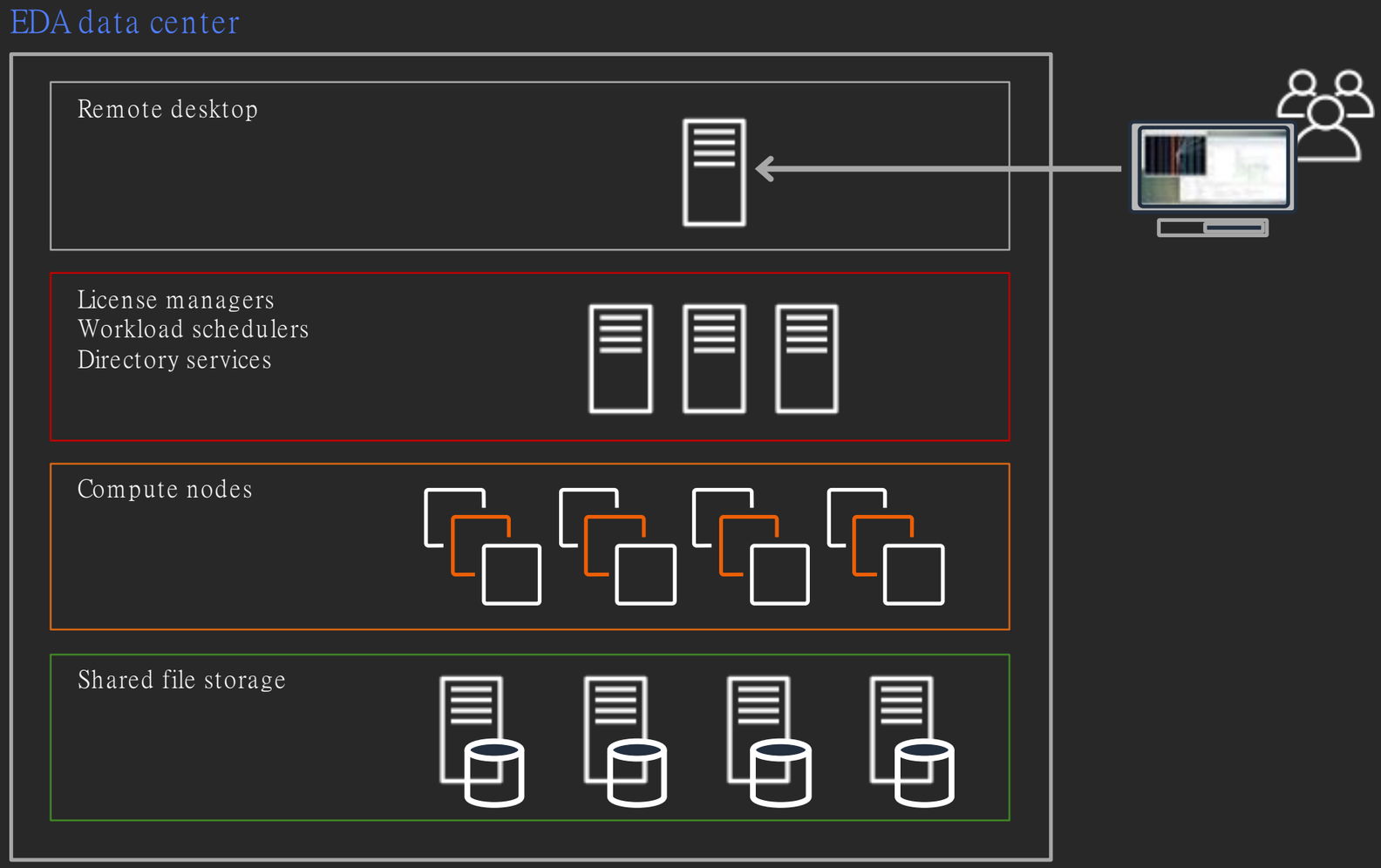
- Innovate faster – Prototype, design, and verify complex systems-on-chip, using scalable cloud resources for Electronic Design Automation (EDA).
- Collaborate better – Work seamlessly and securely with third-party partners including IP providers, EDA software vendors, and manufacturing service providers (foundries, OSATs, contract and original device manufacturers).
- Reduce risk – Advanced silicon and system verification is hard, and getting harder. Mistakes can cost millions if not billions of dollars for a larger companies.
- Reduce cost – Stop wasting CAPEX on IT, and stop wasting valuable engineering time.

Digital IC Design Flow



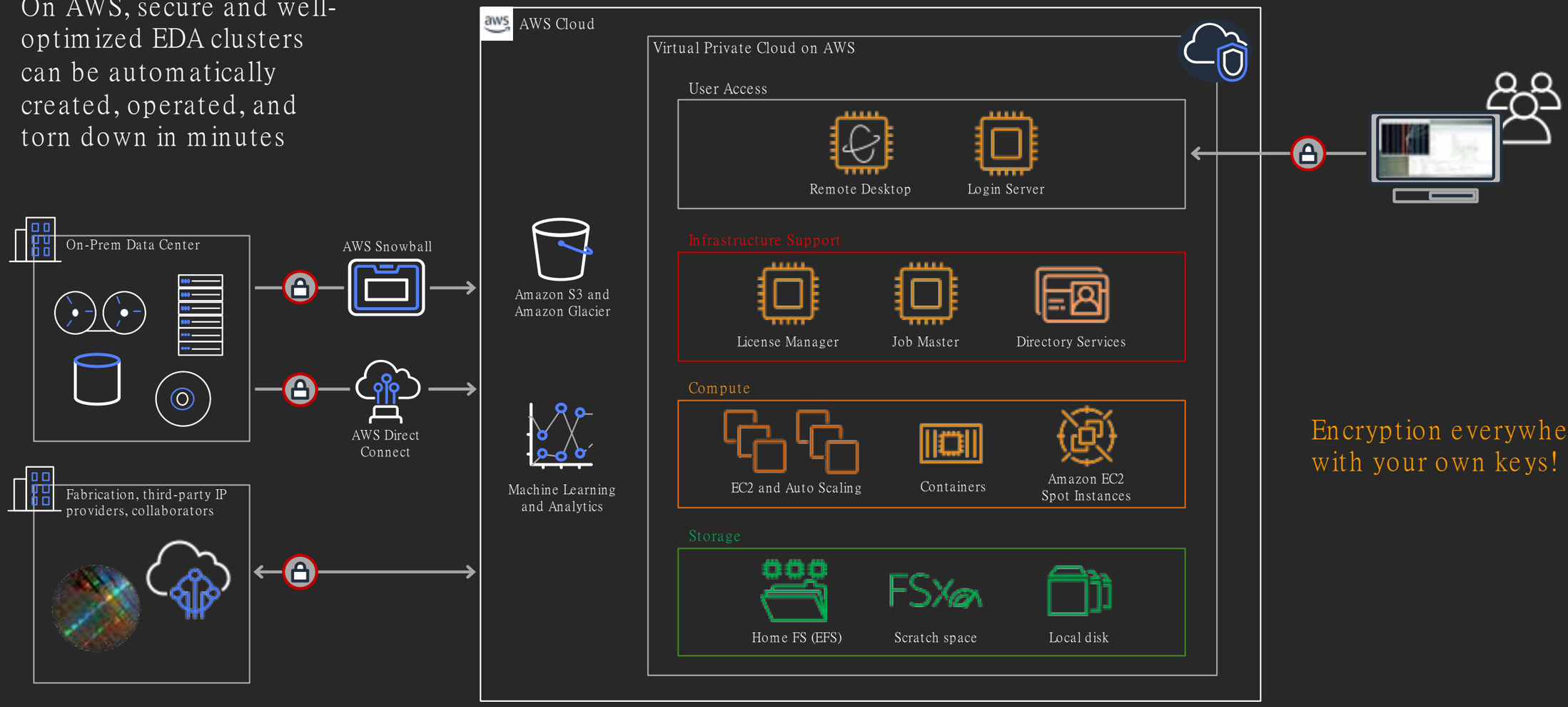
Electronic Design Automation Infrastructure

TRADITIONAL EDA IT STACK



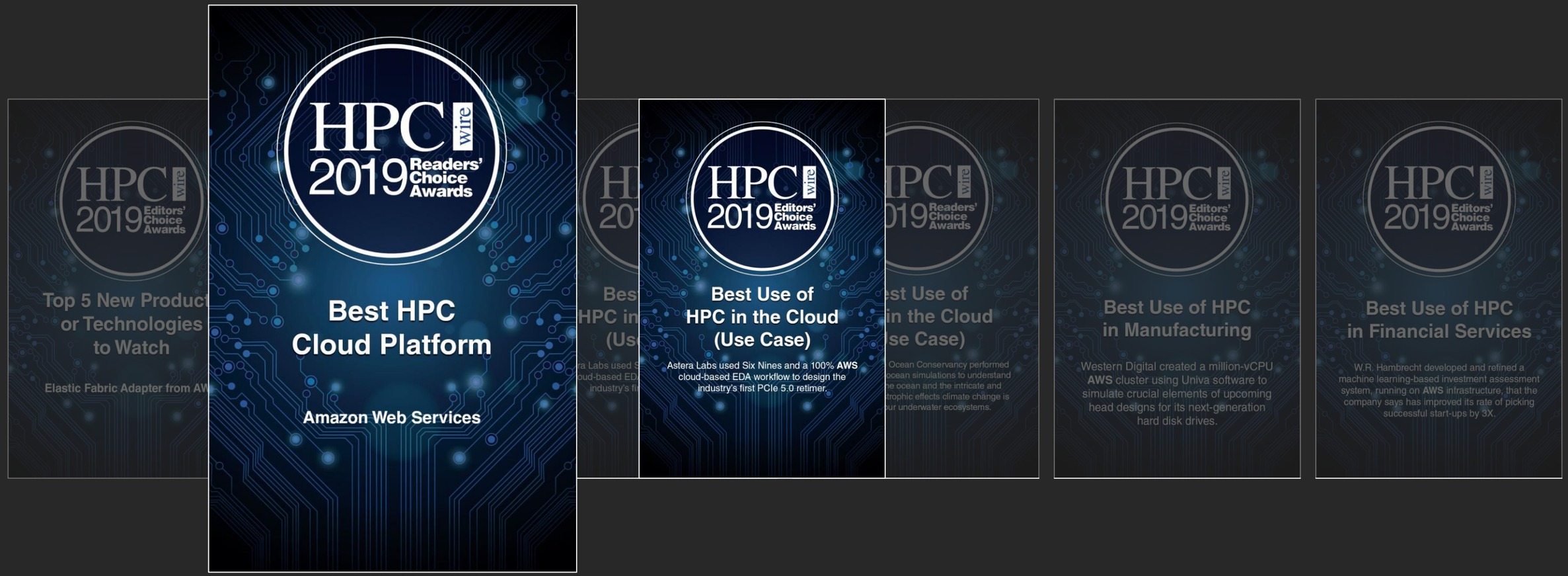
EDA Infrastructure on AWS

On AWS, secure and well-optimized EDA clusters can be automatically created, operated, and torn down in minutes



Encryption everywhere - with your own keys!

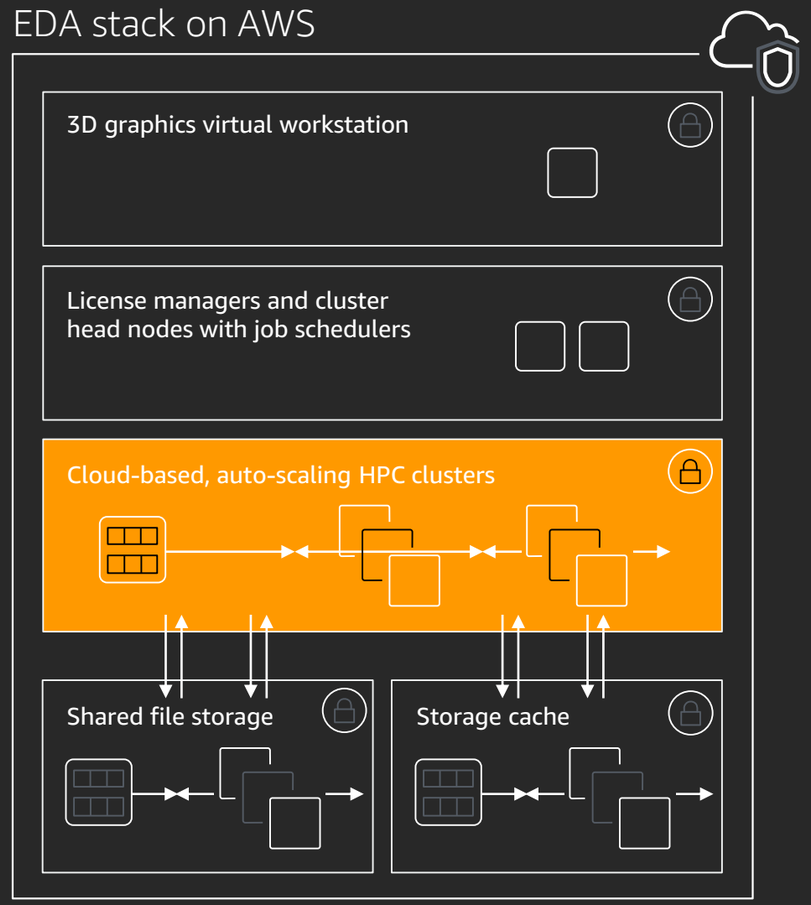
HPCwire: Best HPC Cloud Platform



High clock speed compute instances: z1d

Up to 4 GHz sustained, all-turbo performance

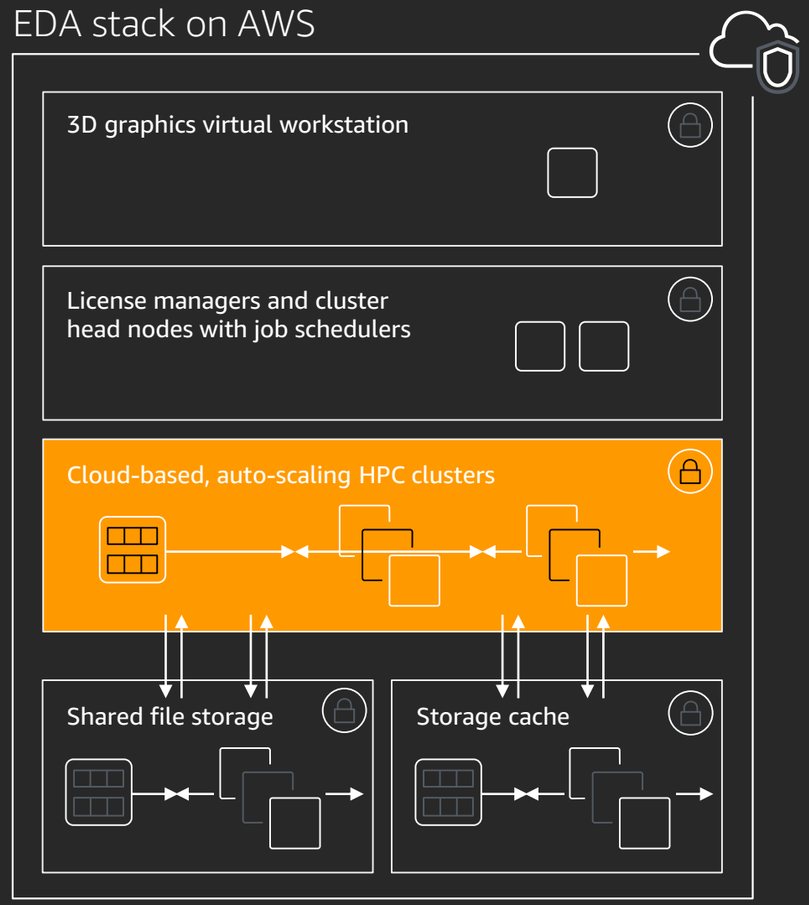
- Z1d instances are optimized for memory-intensive, compute-intensive applications
- Custom Intel Xeon Scalable processor
- Up to 4 GHz sustained, all-turbo performance
- Up to 385GiB DDR4 memory
- Enhanced networking, up to 25 GB throughput



High bandwidth instances: C5n, M5n, R5n

100 Gbps network performance

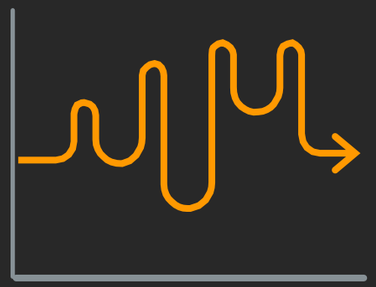
- C5n, M5n, and R5n instances offer up to 100 Gbps of network bandwidth
- Significant improvements in maximum bandwidth, packet per seconds, and packets processing
- Purpose-built to run network bound workloads including distributed cluster and database workloads, HPC, real-time communications and video streaming



Lower TCO with Amazon EC2 purchase options

On-Demand

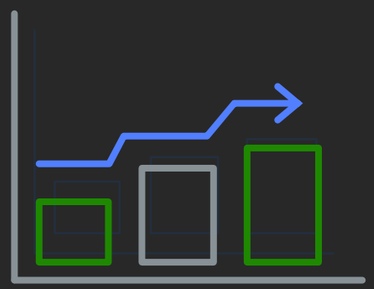
Pay for compute capacity by **the second** with no long-term commitments



Spiky workloads, to define needs

Reserved Instances & Savings Plan

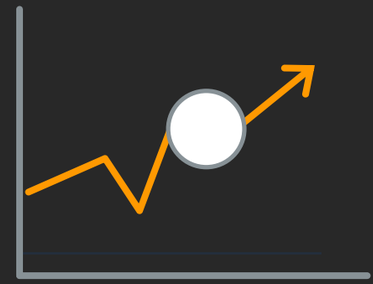
Make a commitment and receive a **significant discount** off compute



Committed and steady-state usage

Spot Instances

Spare EC2 capacity at **savings of up to 90%** off On-Demand prices

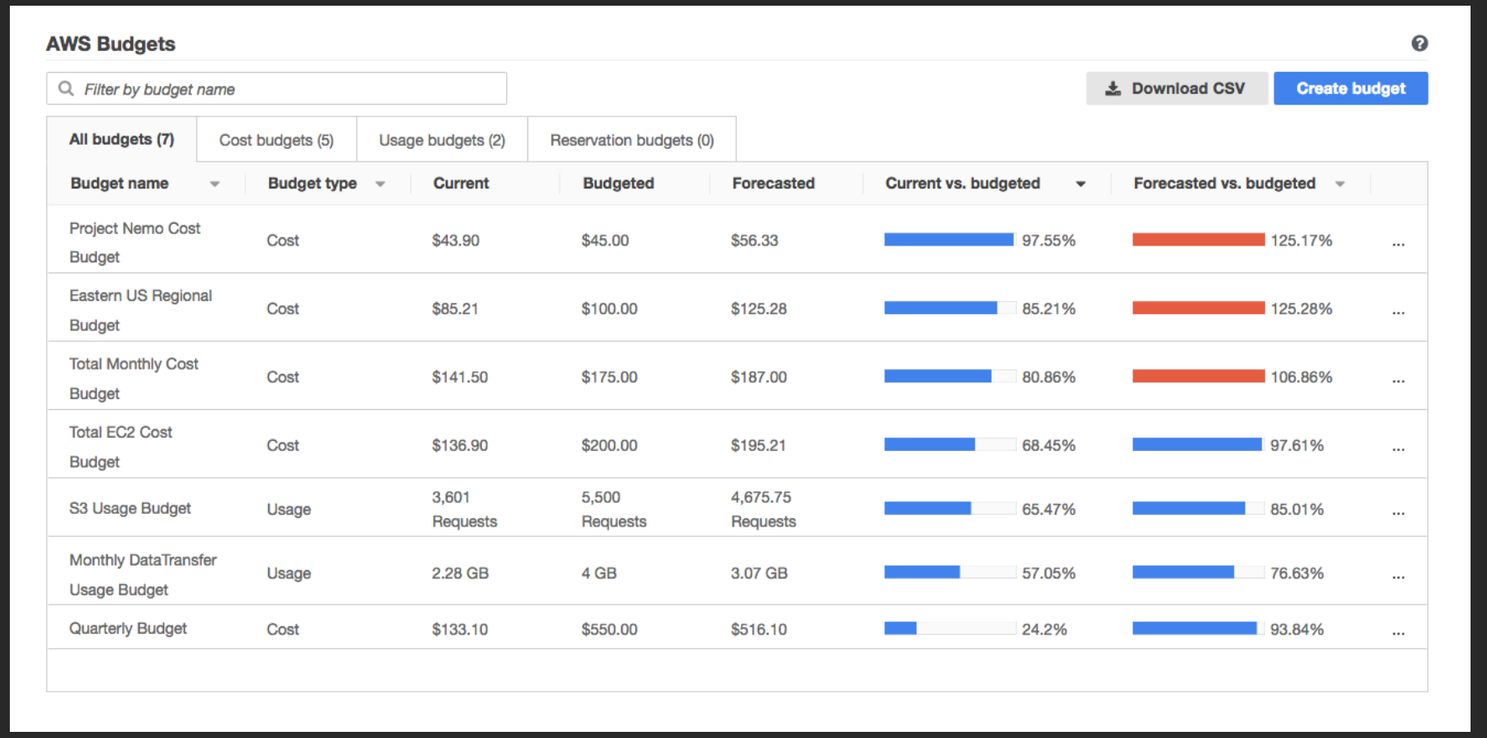


Large-scale fault-tolerant, flexible workloads

AWS Budgets Dashboard

MONITOR THE PERFORMANCE OF MULTIPLE BUDGETS

- Aggregate similar Budgets for a comprehensive view of trends
- Email Budget reports to members of your organization on a daily, weekly, or monthly basis.
- Use Budget API for automated budget compliance management



File system options for EDA

Amazon EFS

Scalable, elastic, cloud-native file system for Linux

Amazon FSx for Lustre

Fully managed shared file systems for high performance computing workloads

Amazon EC2 + Amazon EBS

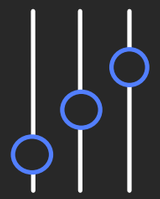
- Build your own self-managed NFS server
- AWS Marketplace

Fully managed high performance shared file system

Amazon FSx for Lustre

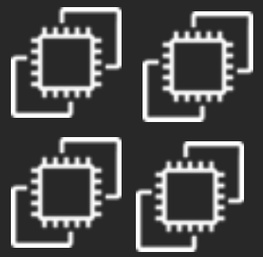
Massively scalable performance

- 100+ GiB/s throughput
- Millions of IOPS
- Consistent low latencies

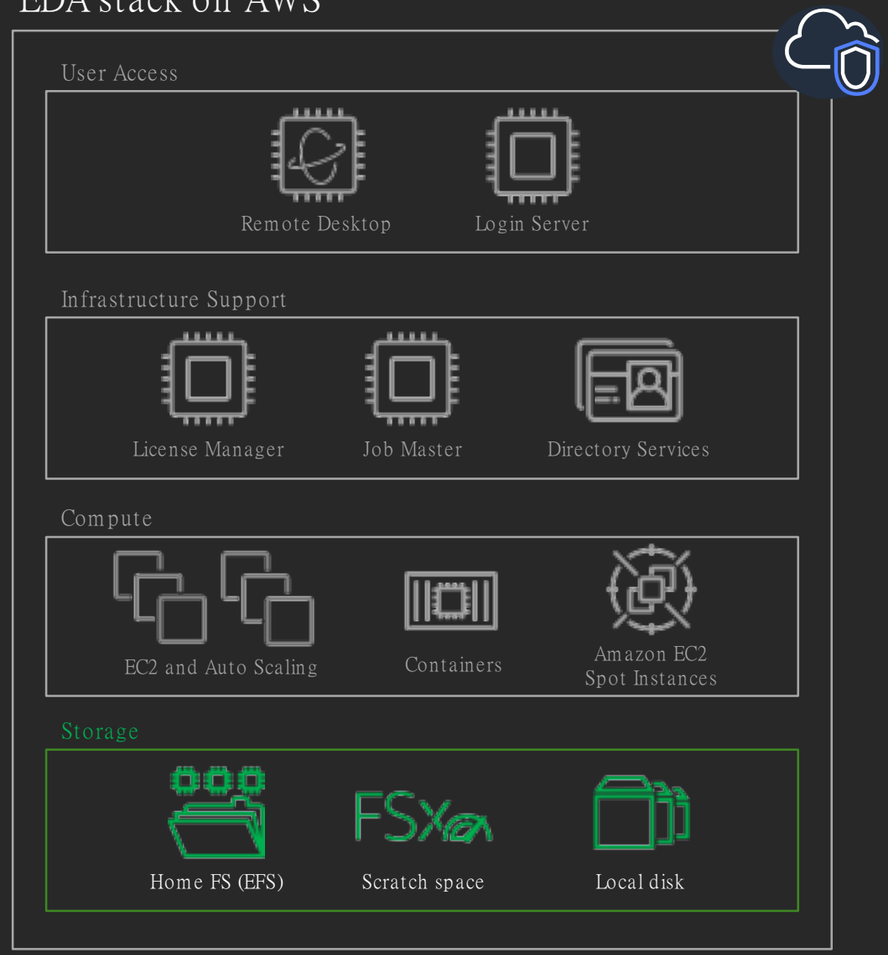


Parallel distributed file system

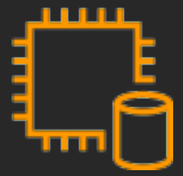
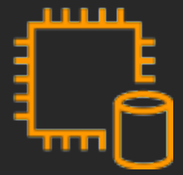
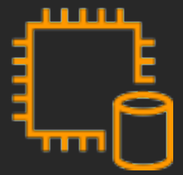
SSD-based



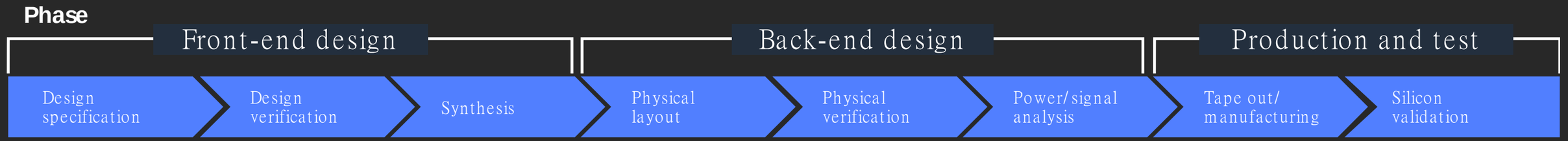
Supports hundreds of thousands of cores



Mapping storage to EDA data types

		Data type	Storage solutions		
PERSISTENT	READ-ONLY	Tools	 DIY/ Marketplace NFS server	 Amazon EFS	 Amazon FSx for Lustre
		IP libraries			
	READ-WRITE	Project	 DIY/ Marketplace NFS server		 Amazon FSx for Lustre
		Home			
TEMPORARY	READ-WRITE	Workspaces	 DIY/ Marketplace NFS server		 Amazon FSx for Lustre
		Scratch			

Technology partners for silicon design: examples



Full flow providers

cadence · Mentor A Siemens Business · SYNOPSYS

IP providers

arm · cadence · Mentor A Siemens Business · SYNOPSYS

Extraction, power, EM

ANSYS

Quality, yield, and failure analysis

PDF SOLUTIONS · proteanTecs

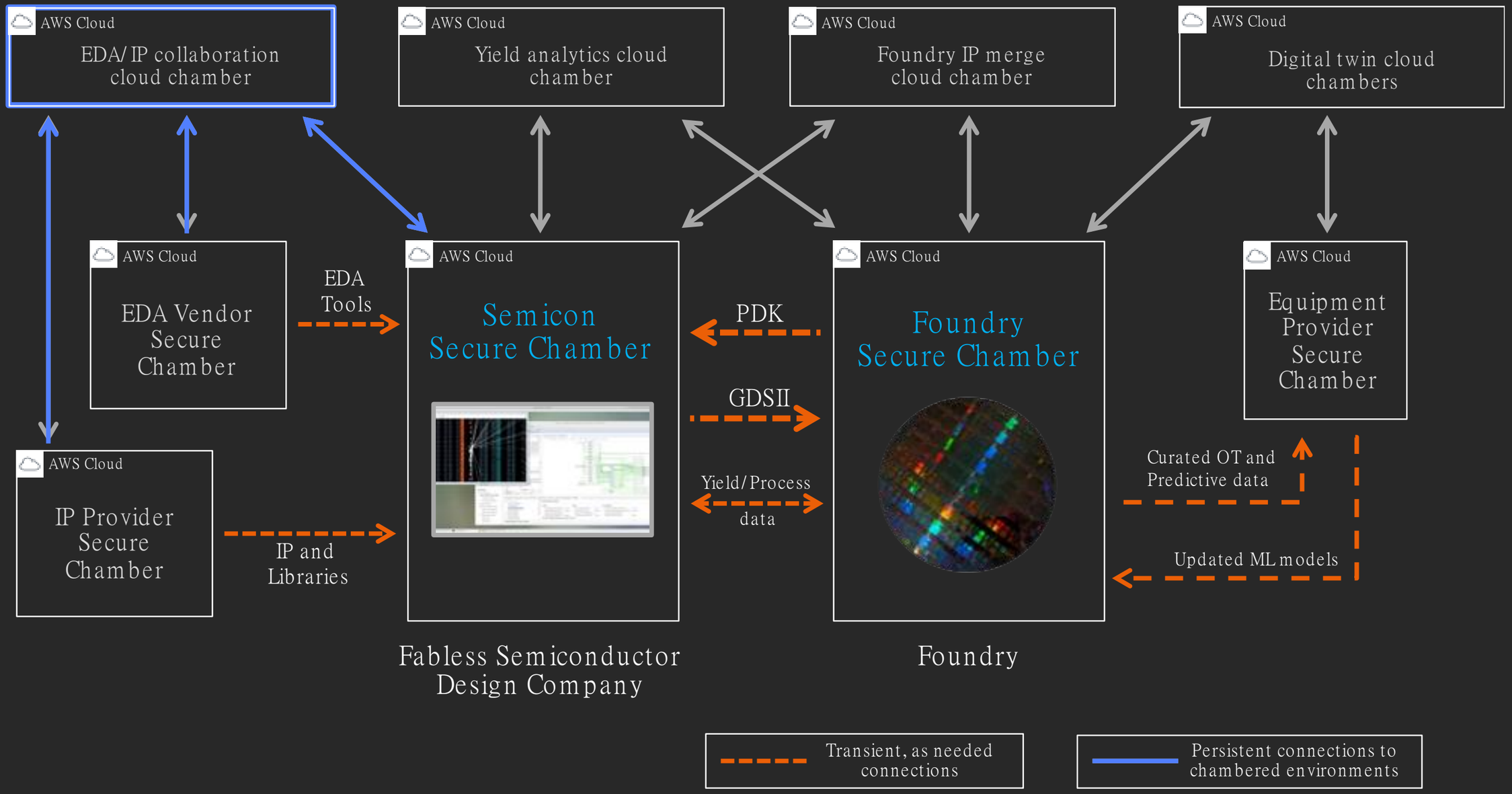
High Volume Manufacturing (HVM)

OPTIMAL+

Design flow and file management

CLIO SOFT · DASSAULT SYSTEMES · IC manage · methodics

Cloud enables secure collaboration



Scale-out computing on AWS

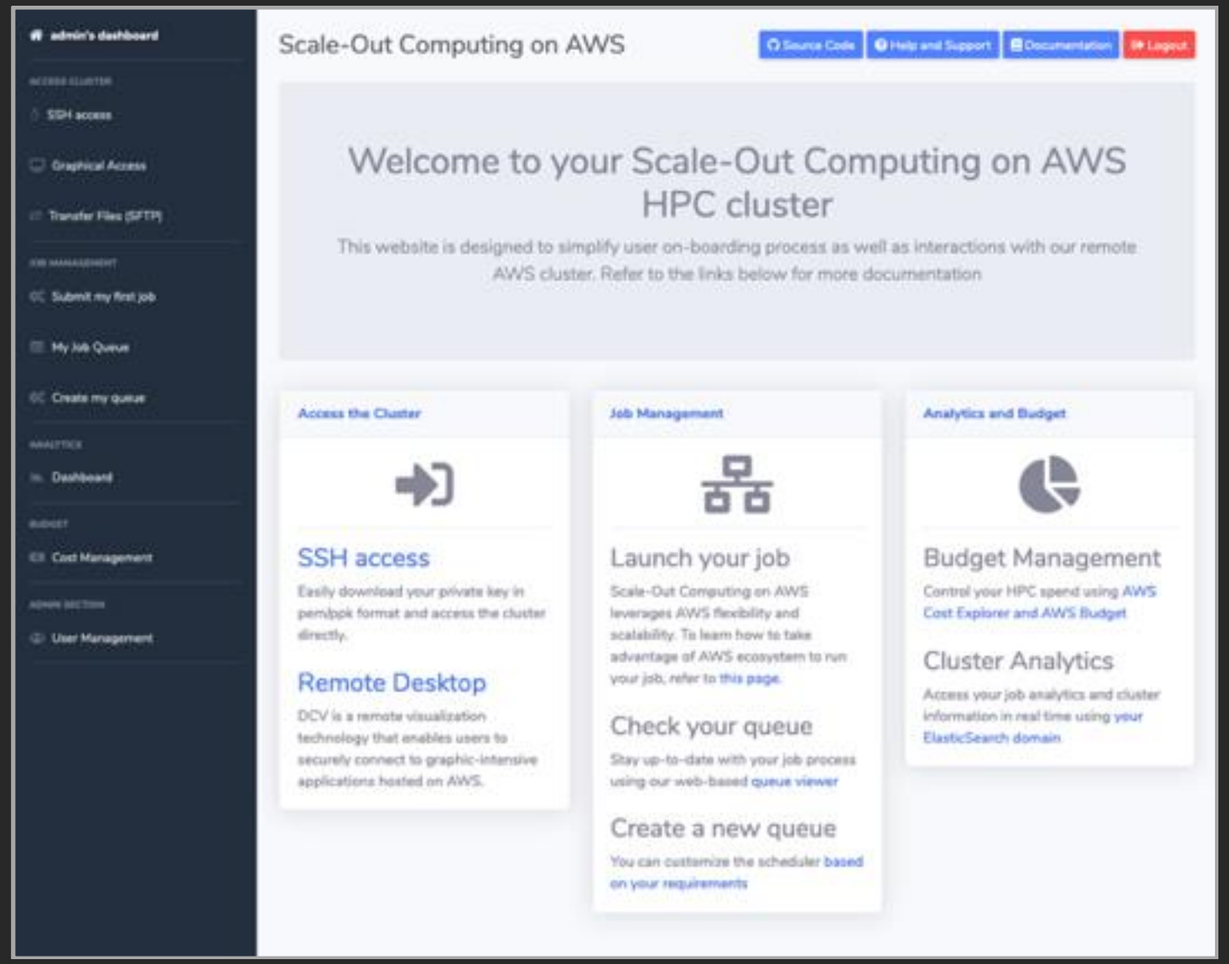
aws.amazon.com/solutions/scale-out-computing-on-aws

Framework behind Amazon Devices Lab126 HPC environment

Enables engineers/scientists with minimal cloud and/or Linux experience

Official AWS Solution:

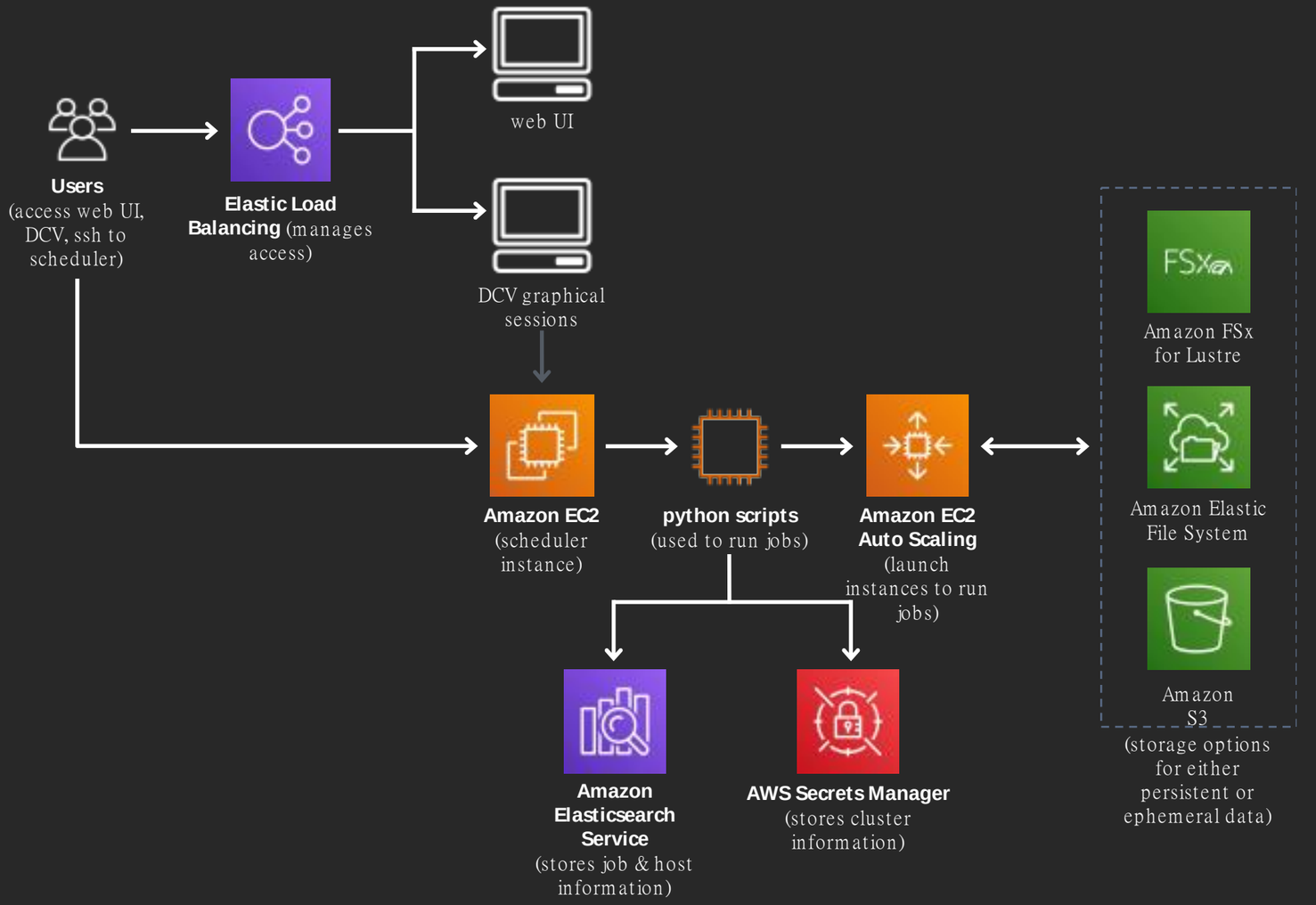
"Vetted, technical reference implementations designed to help you solve common problems and build faster"



Scale-out computing on AWS

aws.amazon.com/solutions/scale-out-computing-on-aws

- AWS Solution
- EDA/HPC environment on AWS
- Easy installation in your AWS account
- Amazon EC2 Integration
- Simple job submission
- OS agnostic and AMI support
- Desktop cloud visualization
- Automatic errors handling
- Web UI
- 100% customizable
- Persistent and unlimited storage
- Centralized user-management
- Support for network licenses
- EFA support
- Simple cost/budget management
- Detailed cluster analytics
- Used in production



疫情下---
AWS 帶給 IC Design 雲端新思維

Mr. Sando Chen
COO
VIA CPU Platform, Inc.

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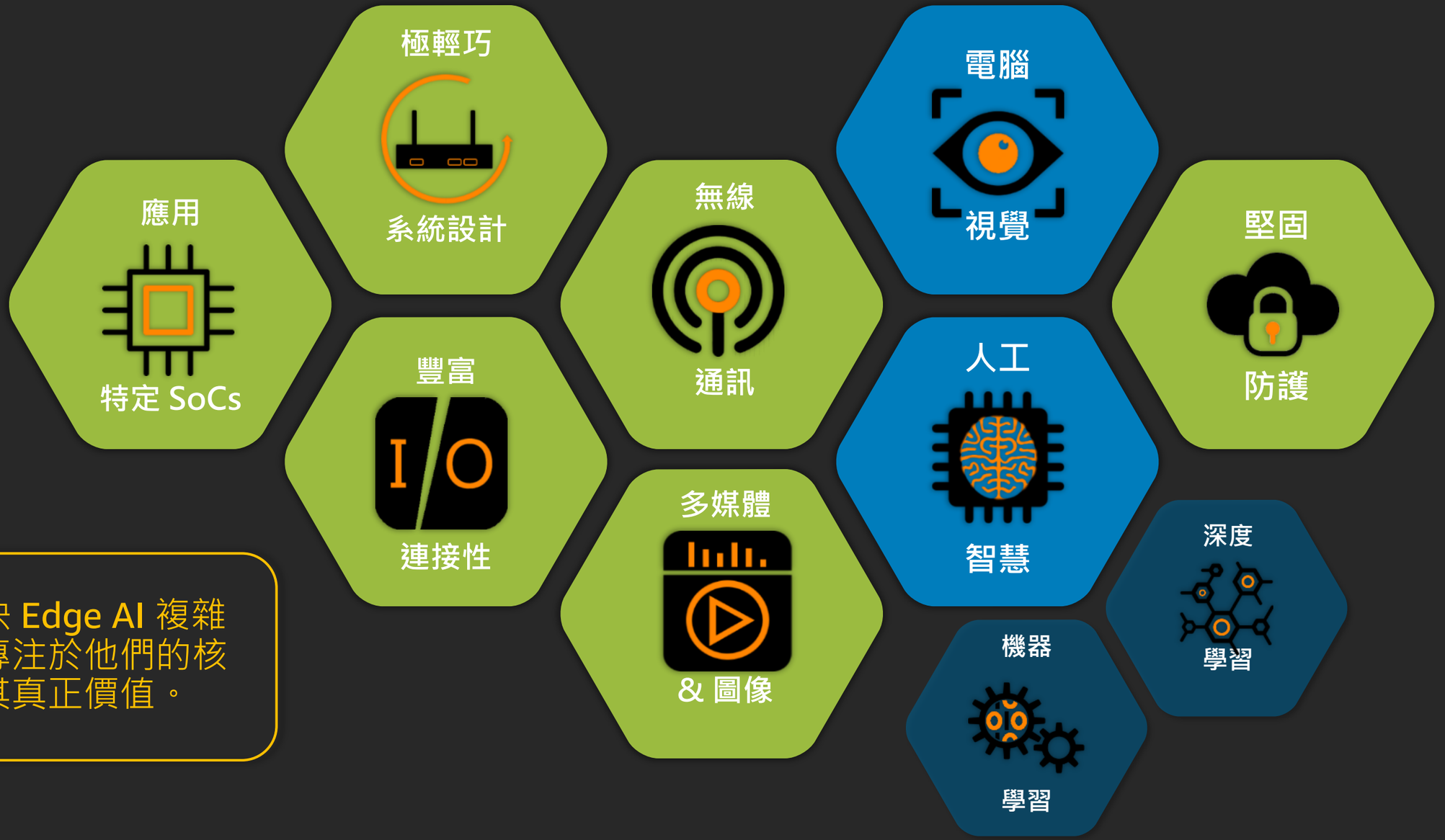
Agenda

1. Introduction of VIA Group
2. Challenges from COVID-19 Pandemic
3. Solution
4. Architecture
5. Results
6. Summary

客製化設計服務



於每個連結點解決 Edge AI 複雜性，使客戶能夠專注於他們的核心應用並獲得其真正價值。

完整核心支援

SoCs
- 特定SoC的廣泛應用
- NXP, Qualcomm, &威盛

無線連接
- Wi-Fi, BT & 3G/4G 安全無線模組
- Zigbee, Zwave, KNX 跨通訊協議
- OCF 成員

I/O 整合
- 豐富的客製化 I/O 套組
- 針對舊式 I/O 的完善整合及支援

電腦視覺
- USB, 網路攝影機, 支援類比及數位 CSI 攝影機
- 卓越的 360° 圖像拼接

系統設計
- 高效能及低功耗
- 寬域工作溫度
- Linux/Android BSP及SDK

人工智慧
- AI 演算法及模型訓練服務
- 機器及&深度學習
- ADAS, 人臉辨識 & 物體偵測

多媒體及圖像
- 顯示
  - 支援多螢幕輸出
  - 4K UHD
- 攝影機
  - 圖像拼接
  - 自動白平衡

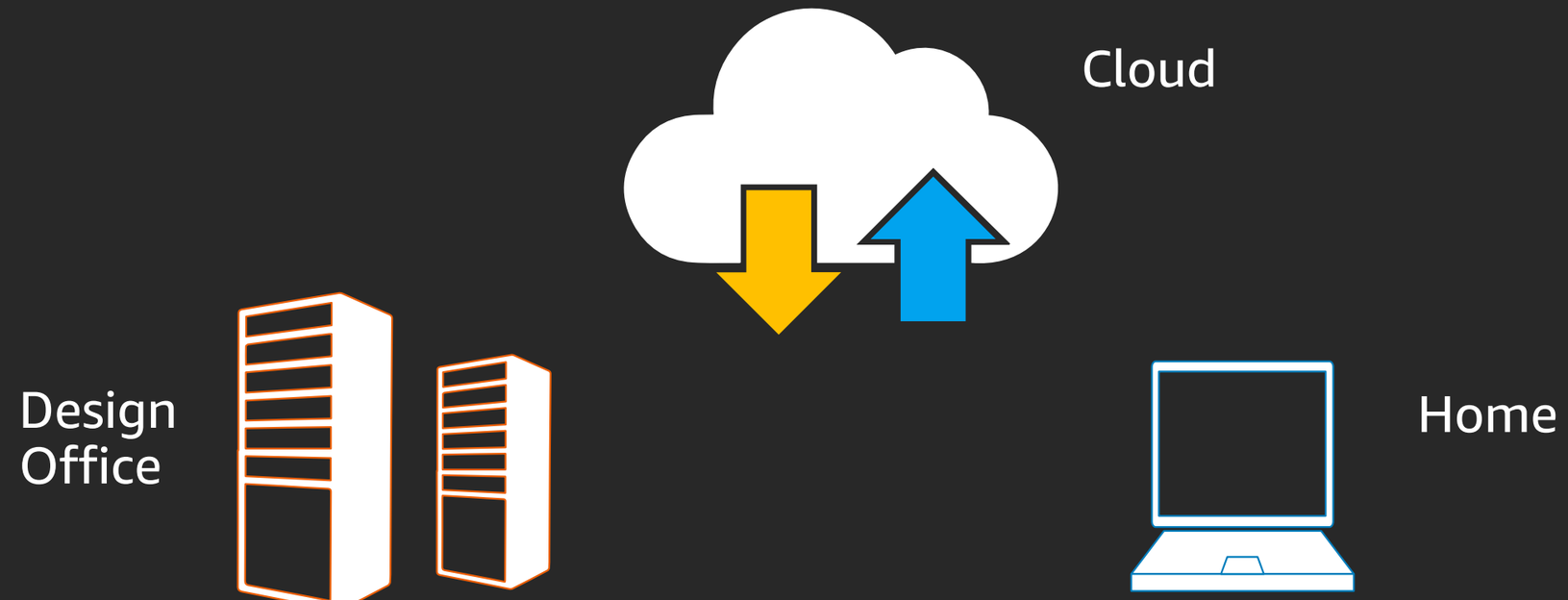
安全性
- 使用 TrustZone 服務進行安全啟動，安心儲存
- 全盤加密，安全顯示
- TLS/HTTPS 網路通訊防護

Challenges from COVID-19 Pandemic

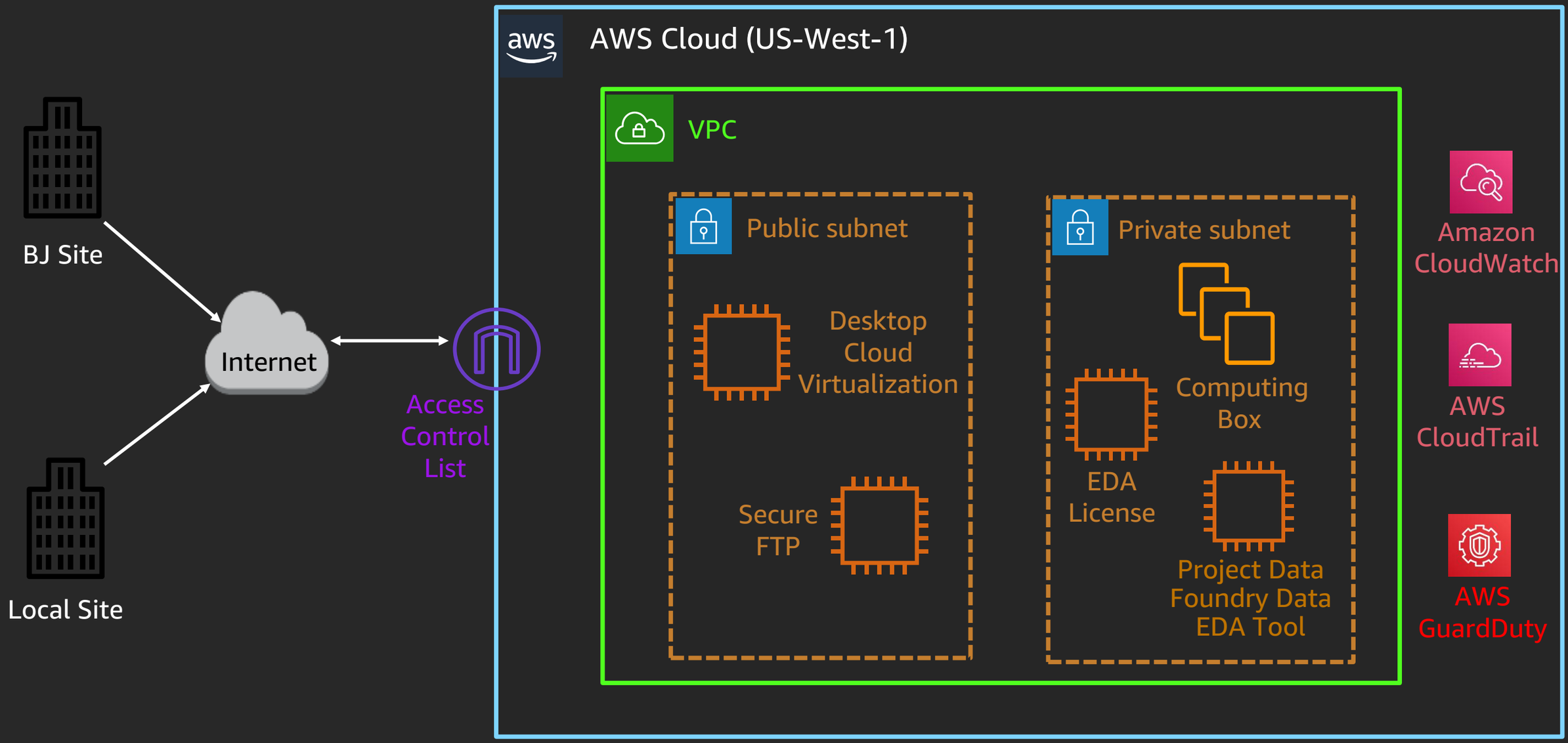
- Advance technology IC design project 6nm
  - Security control
  - EDA workload
  - Computing scale
  - Data Storage
- Pandemic impacts project schedule unexpectedly
  - Work from Home

AWS Cloud to Solve Problem

- Security environment certified by foundry
- Build up infrastructure quickly
- Give proven EDA running experience
- Smooth data transfer between cloud & office

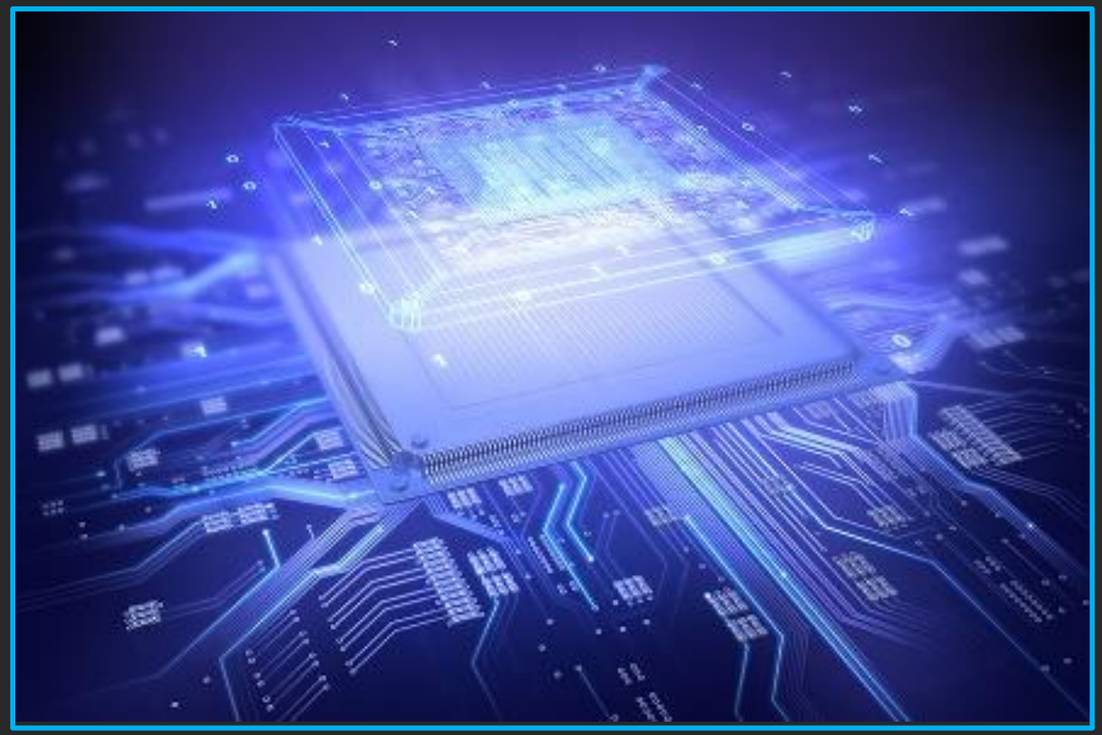


EDA Architecture on AWS Overview



Current Results

- 環境緊急應變: 2~3 天內即建構出 Cloud EDA 環境
- 工作效率提升:
  - 縮短 IP Porting 時間。
  - 讓 project 時程有提早的機會。



Summary

- IC Design 的新思維
- 資料安全保護
- 敏捷環境搭建
- EDA 使用經驗
- 持續技術服務以監控成本

What’s next in Semiconductor with AWS

Attila Lin
Lead of Enterprise Business Development
Amazon Web Services

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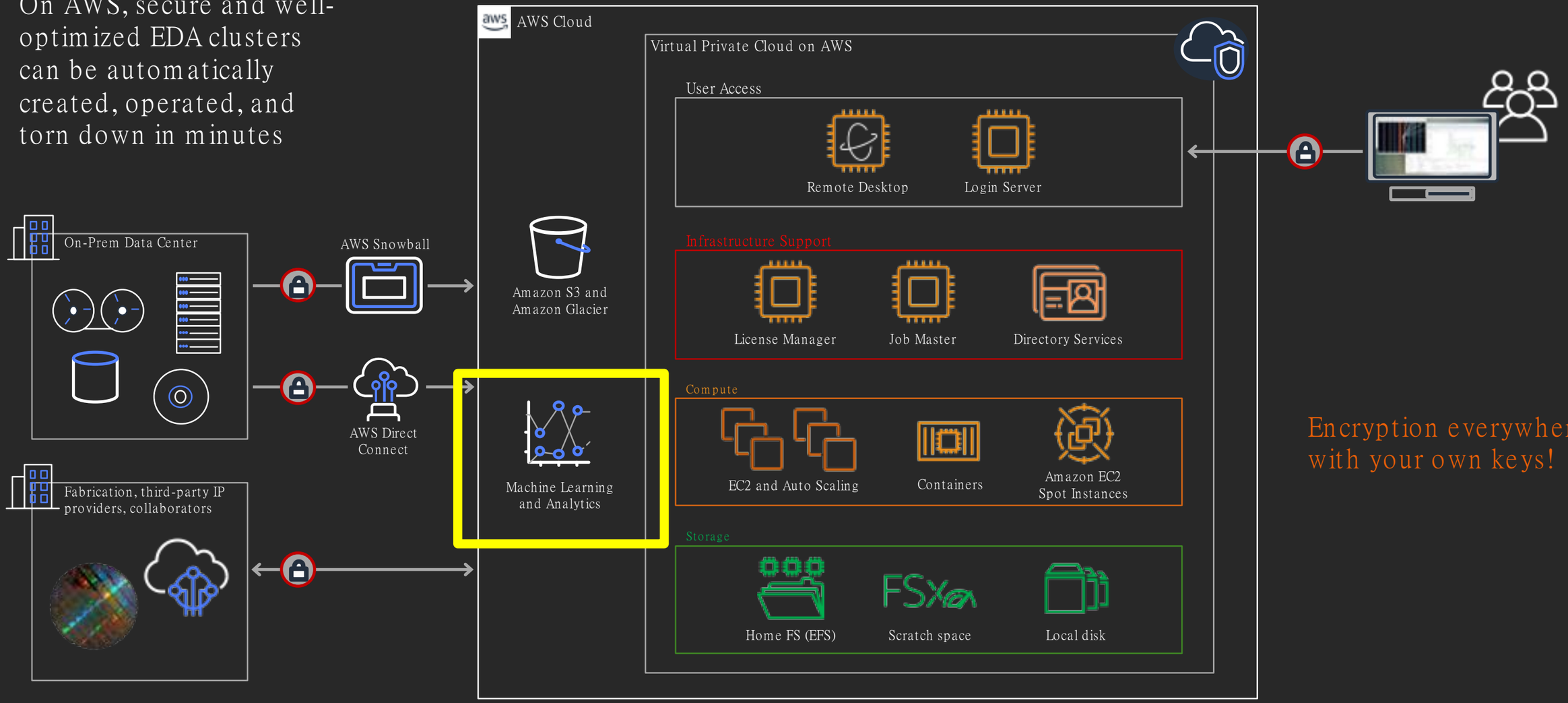
EDA Infrastructure on AWS – AI/ML

On AWS, secure and well-optimized EDA clusters can be automatically created, operated, and torn down in minutes



Encryption everywhere - with your own keys!

Machine learning for semiconductors

Applications throughout design and production

- Design and verification
- Intelligent local and global routing
- Timing analysis and DRC
- Simulation parameter selection
- **Design flow optimization**
- **Resource prediction**
- And more

- Manufacturing and supply chain
- Lithography optimization
- **Defect detection and classification**
- **Yield** diagnostics and failure prediction
- **Predictive maintenance** and OEE
- Early-life failure analysis
- Excursion prevention
- And more

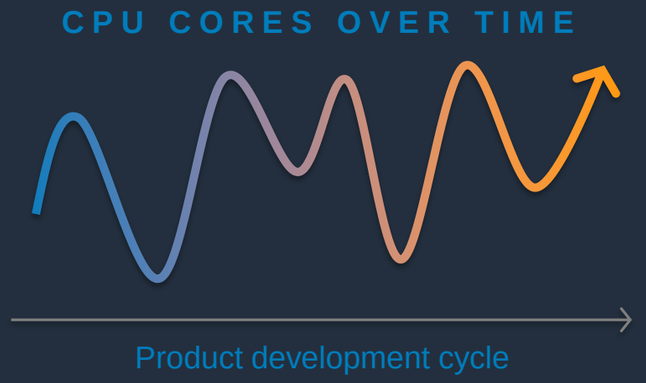
Faster design throughput with rapid, massive scaling

Scale up when needed, then scale down

- In a traditional EDA datacenter, **the only certainty is that you always have the wrong number of servers**—too few, or too many
- Every additional EDA server launched in the cloud can improve speed of innovation—if there are no other constraints to scaling
- Overnight or over-weekend workloads reduced to an hour or less

Think **BIG**

What if you could launch 1 million concurrent verification jobs?



aws

Tips for EDA in the cloud

1. Leadership Alignment

2. Think big but start small
   - Don't try to do seamless bursting or cloud-native workflows at first.
   - Start with EDA workloads or projects that are important but not critical and have few on-prem dependencies.
   - Build a controlled cloud environment with qualified flows and a trained set of users who know they are in the cloud.

3. Stay familiar
   - Start with a familiar environment to leverage your staff's expertise where you can.
   - Use the AWS integration in commercial schedulers that are commonly found in EDA.
   - If you are using NetApp, consider NetApp in the cloud.
   - Leverage your DDM solutions to keep design data and libraries in sync.

4. Use EC2 Spot!
   - You're scale-out flows are likely already fault tolerant.

5. Centralize your data
   - The more data sources you keep in AWS, the more options you have for machine learning and analytics.

6. Train your builders
   - You already have the people you need to succeed in the cloud. Enable them.

Thank you!

Jhen-Wei Huang
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