
AWS
re:Invent

MFG304

Semiconductor design on AWS with Qualcomm

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Agenda

AWS for semiconductor design

Qualcomm – Hybrid cloud for Electronic Design Automation (EDA) workloads

Resources for running workflows on AWS



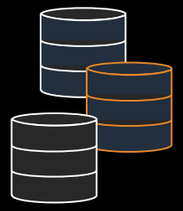
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AWS is a fundamental rethink

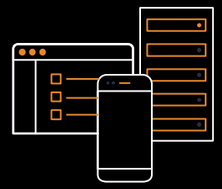
From worrying about



Capex

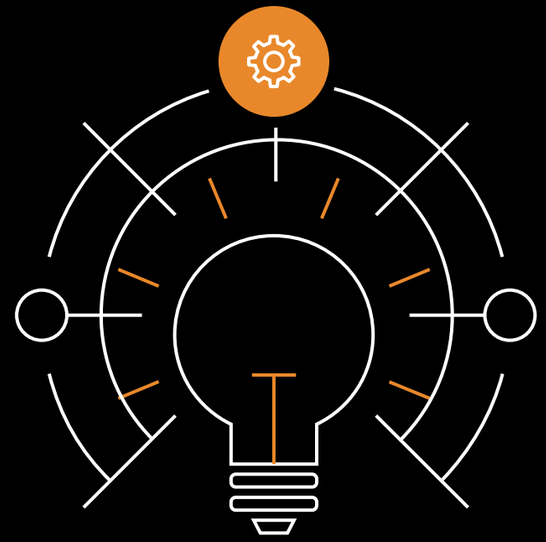


Capacity



Technology

to



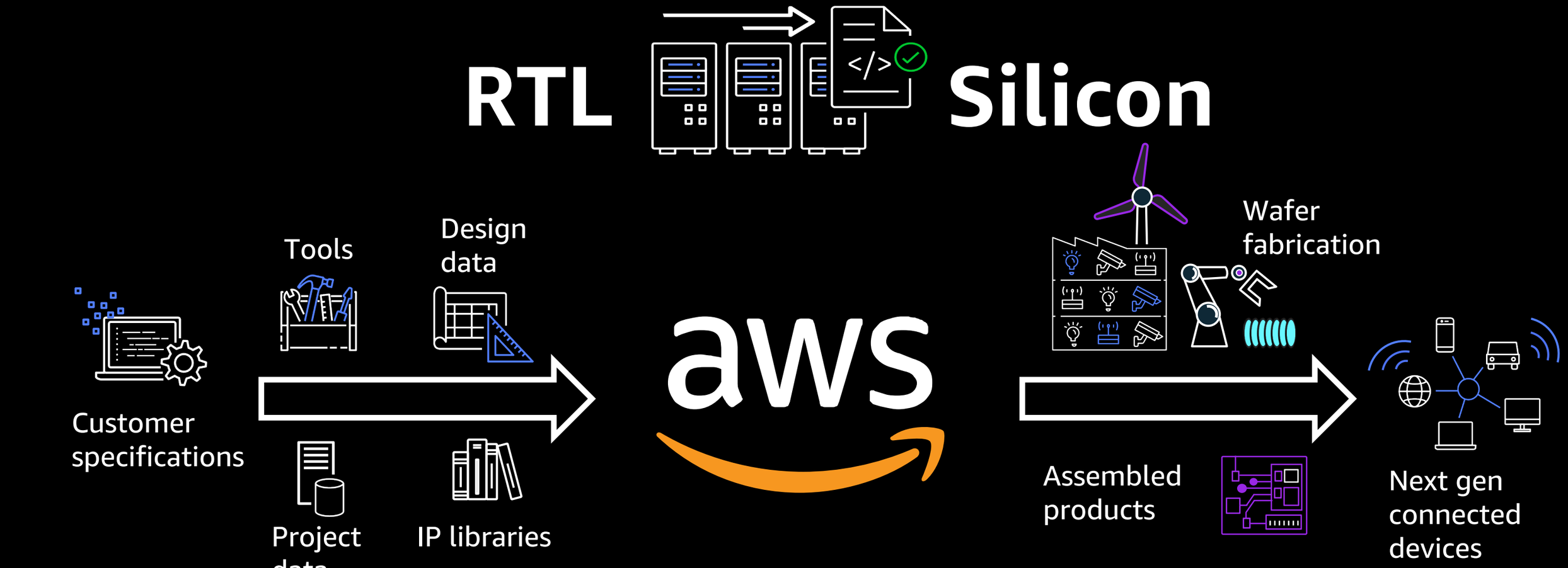
Focusing on innovation

Why AWS?

Innovate faster	Collaborate better	Reduce risk	Reduce cost
24 Launched Regions Each with multiple Availability Zones (AZs)	**6 Announced Regions**	**77 Availability Zones**	**5 Local Zones** **8 Wavelength Zones** For ultra-low latency applications
2x More Regions With more AZs than the next largest cloud provider	**245 Countries and territories served**	**97 Direct Connect locations**	**220+ Points of presence** 210+ Edge locations and 12 regional edge caches



Semiconductor design on AWS



Innovations enabled on AWS

IP characterization

Static timing analysis

Place and route

AWS semiconductor customers are running their entire workflow . . .

Extraction and DRC

Optical proximity correction

Entire SOC tapeout

RTL regressions

Logical synthesis

Hybrid cloud for EDA workloads

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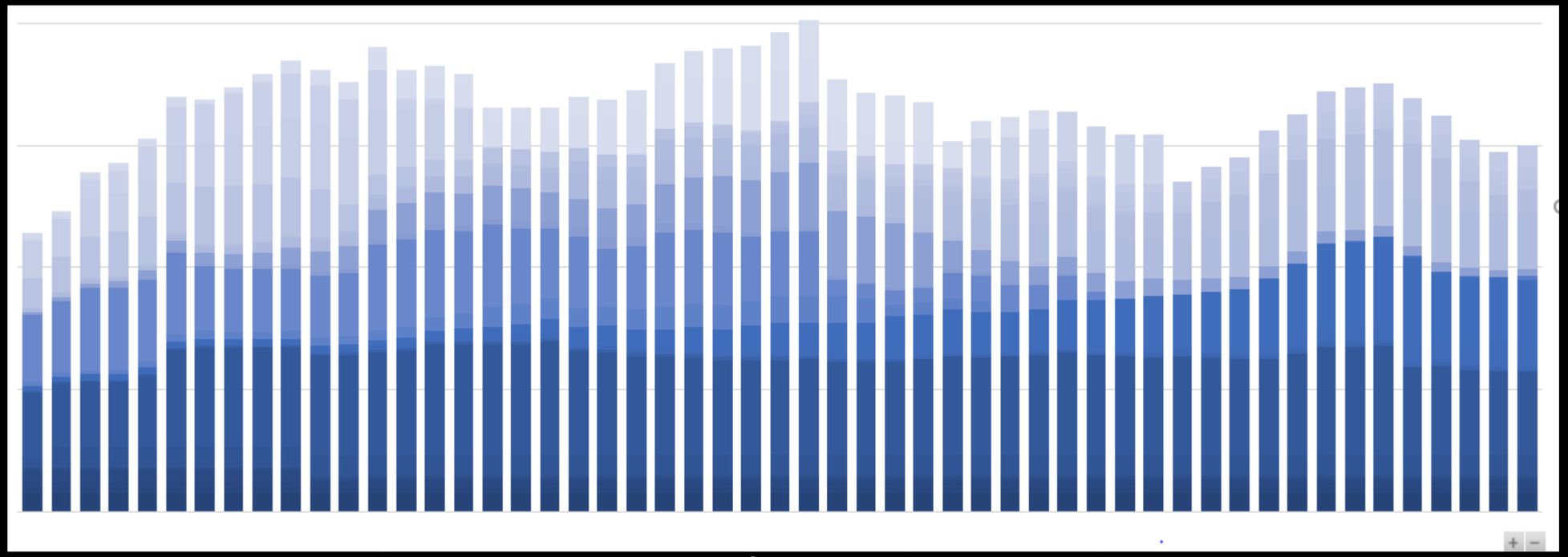


Source: The 5G Economy, an independent study from IHS Markit, commissioned by Qualcomm, October 2019

IHS market study from 2019 commissioned by Qualcomm Incorporated

Global demand management

FINITE RESOURCES AT MULTIPLE DATA CENTERS



Compute demand fluctuation over time ->

The number of products designed, increasing chip complexity and node transition create variability and an increase in compute demand year over year

Our use case: Hybrid cloud for EDA

Qualcomm strategic initiative

Problem statement

Enable flexibility in engineering tapeouts during compute demand peaks by executing Static Timing Analysis (STA) in a public cloud environment

Benefit

Offsetting most compute / memory intensive flows for “peak shaving” to Cloud to provide flexibility and enhanced time to market

Challenges

STA is complex to execute and resides at tail end of design cycle, leaving little tolerance for delay

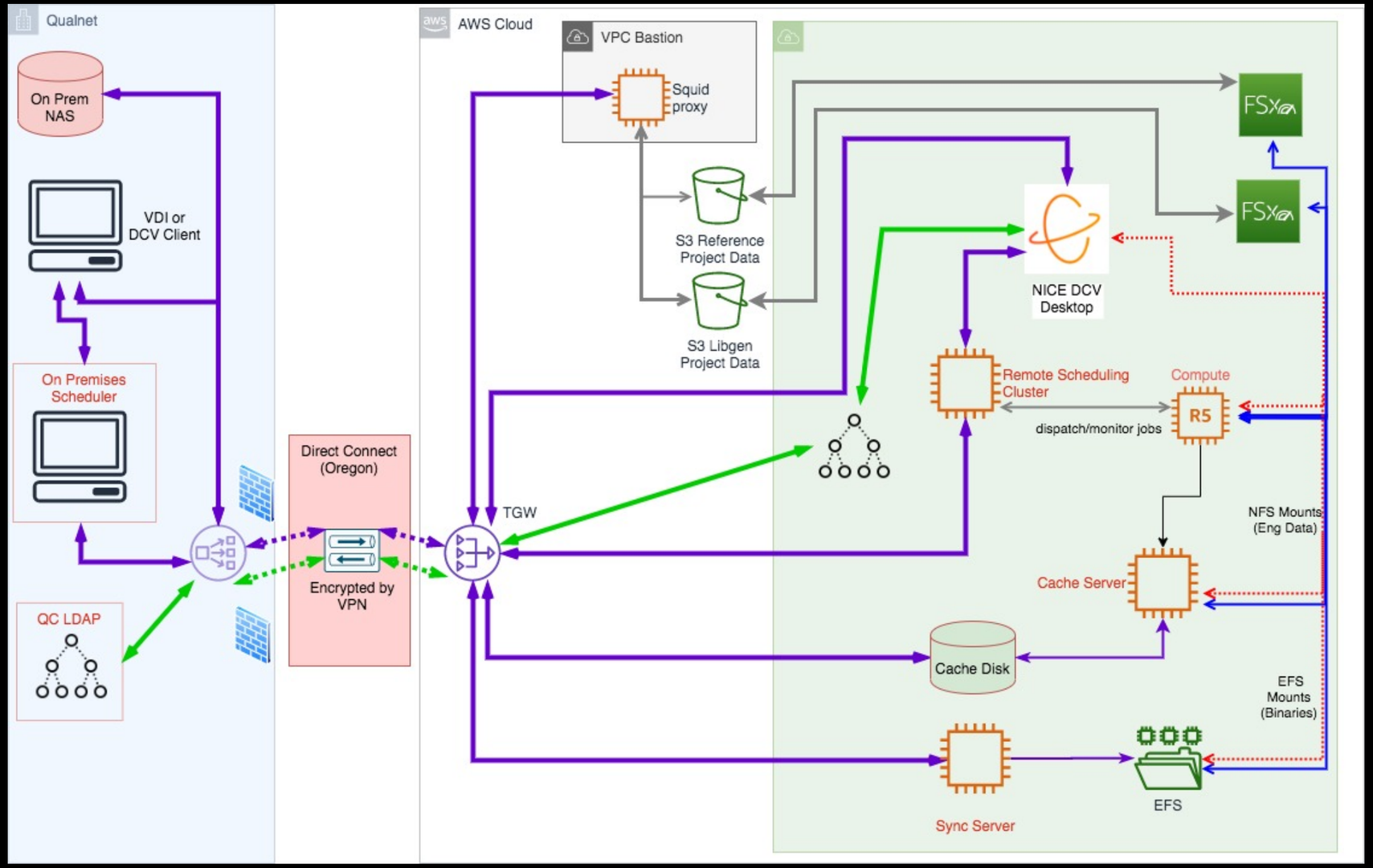
- Data needs
- Concurrency needs
- Adoption needs

Our use case: Hybrid cloud for EDA

OUR ARCHITECTURAL SOLUTION

Hybrid-burst workflow

- Data solutions
- Flow solutions
- Concurrency solution
- Adoption solutions



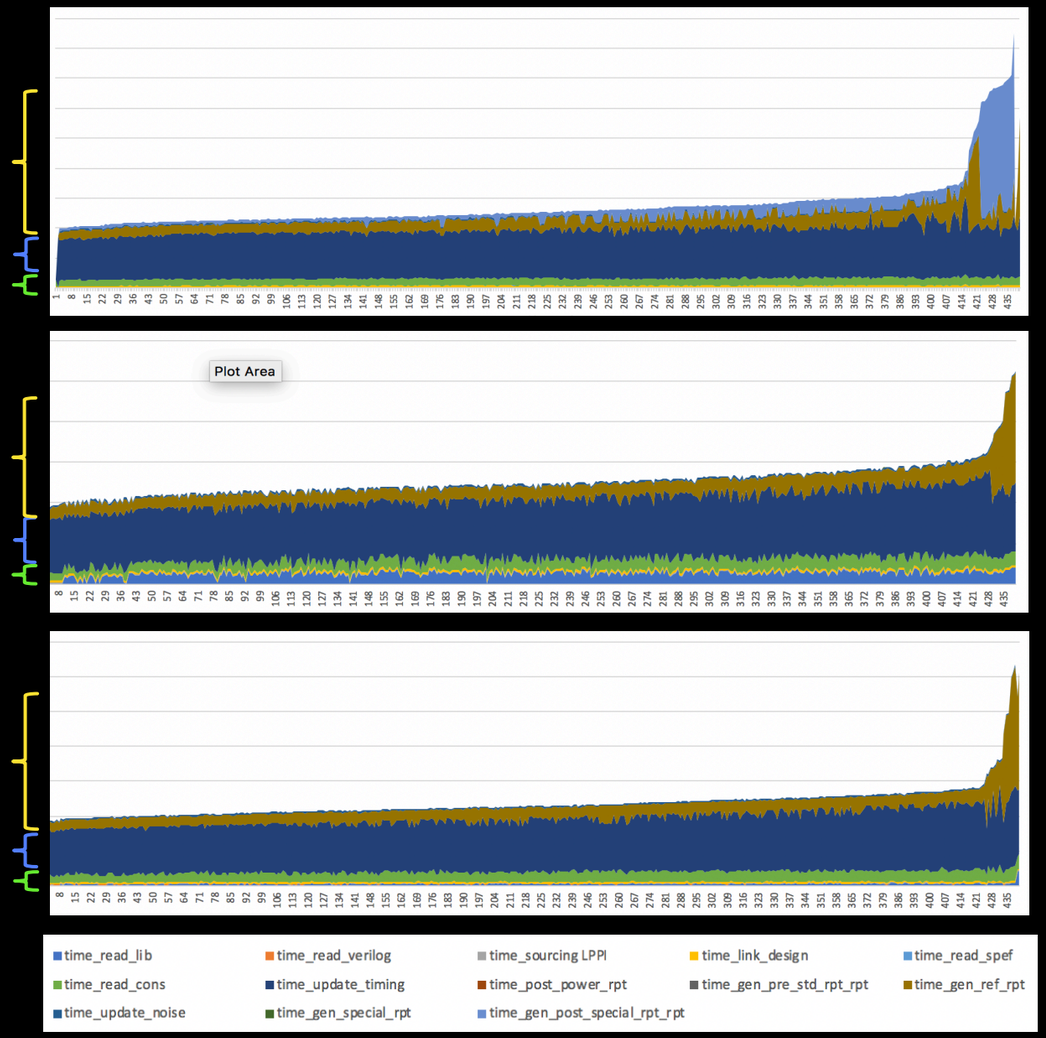
SoC STA run comparison

EXECUTION DYNAMICS PER PHASE

On premises

- AWS
  - Cache
    - Unpopulated

- AWS
  - Cache
    - Populated



Findings

- Achieving comparable aggregate runtimes in EngCloud with STA
- While cache warming smooths **read phase** it is not essential to achieve performant runs
  - Cache's block-based data movement faster than anticipated
- **Compute phase** consistency with on premises achieved with very little optimization
- **Write phase** illustrates benefit of blended storage solution in EngCloud
  - Amazon FSx for Lustre + Amazon S3 and cache

SoC STA run comparison

CORE- AND SOC-LEVEL COMPARISONS TO ON PREMISES

Execution dynamics in AWS		
Type	Average per corner run	Max turnaround window for any corner
PD core-level STA runs	12.8% Faster	24.9% Faster
PD global SOC-level runs	13.6% Faster	27.5% Faster

- Successful execution of STA at SOC level using PrimeTime and StarRC tools from Synopsys
- Demonstrated **equal or better** turnaround time performance relative to on premises
- Data transfer optimized with efficient caching solution

EngCloud production readiness

ORCHESTRATION IS THE KEY!

Target	Description	Status
Accounting and budgeting	LSF level monitoring of AWS budget that prevents execution when exceeded	
Interactive diagnostics	Ability to sync desired results on premises, debug graphically	
Cloud reclamation	Prevent idle instances accruing charges in cloud with automated shutdown	
Security and data governance	Security approval on architecture with continual oversight	

Summary

JOURNEY TO AWS

- Enabled hybrid cloud model for complex workload like STA on Live! Design
- Excellent cooperation between Synopsys, Amazon and Qualcomm Incorporated
- Demonstrated equal or better performance in AWS vs. on premises

Resources for running workflows on AWS



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AWS semiconductor and electronics resources

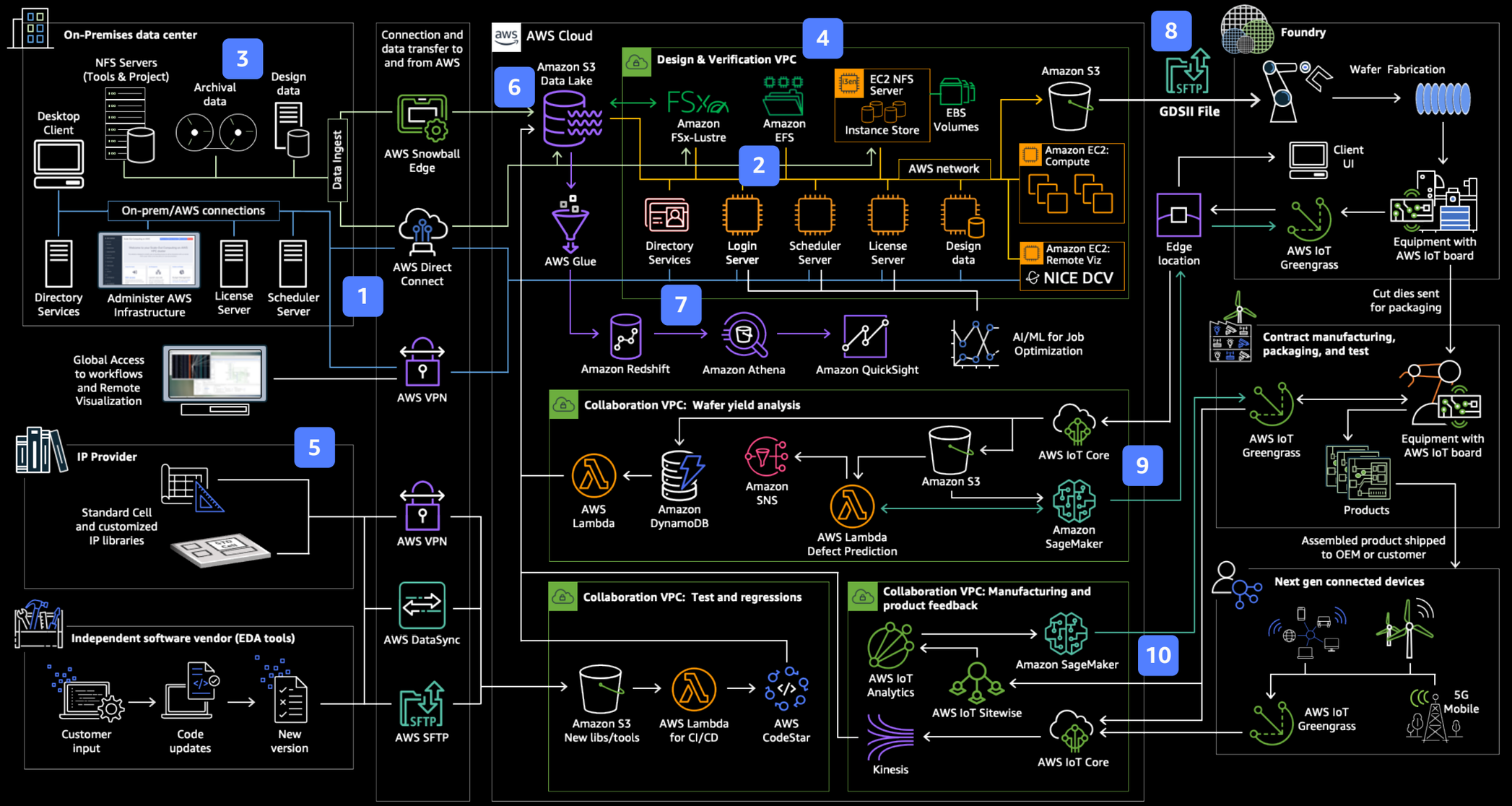
https://aws.amazon.com/semiconductor

Under Resources link

- White papers
- Blogs and articles
- Reference architectures
- Videos and webinars
- Technical tools and training



Semiconductor design reference architecture



1. Connect to AWS using **AWS Direct Connect** and **AWS Site-to-Site VPN**
2. Launch services necessary for PoC (Amazon S3 bucket, login server, license server, etc.)
3. Determine data needed and transfer to storage services: Amazon S3, Amazon FSx for Lustre, Amazon EFS
4. Launch/configure semiconductor design workflow on AWS
5. Enable collaboration with IP providers and tool vendors
6. Convert the previously created S3 bucket (step 2) into data lake
7. Build analytics pipeline leveraging the data lake and **Amazon QuickSight** dashboard
8. Transfer GDSII file to foundry
9. Collaborate with foundry to analyze wafer yields and optimize manufacturing
10. Collaborate with contract manufacturers and gather device data to track defects

Thank you!



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