

Ansys Cloud

HPC as easy as it should be



Click Icons to get re-directed



Challenges

Benefits



Solution

Customer Success



Pricing and
Packaging

Extra Slides





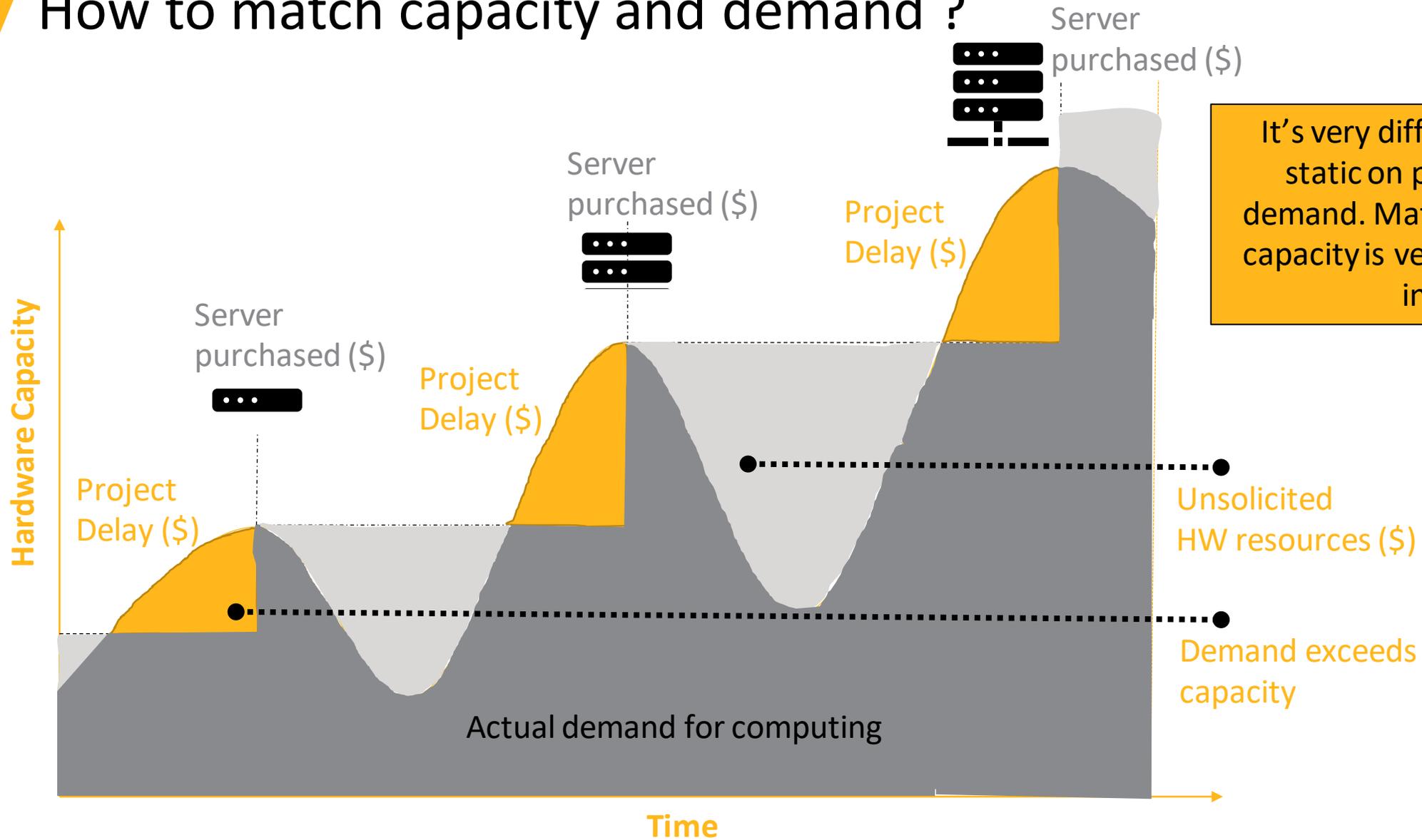
*Click to return
Agenda*

Challenges

Ansys Cloud



How to match capacity and demand ?



It's very difficult to anticipate static on prem computing demand. Matching demand and capacity is very time and capital intensive

/ Challenges

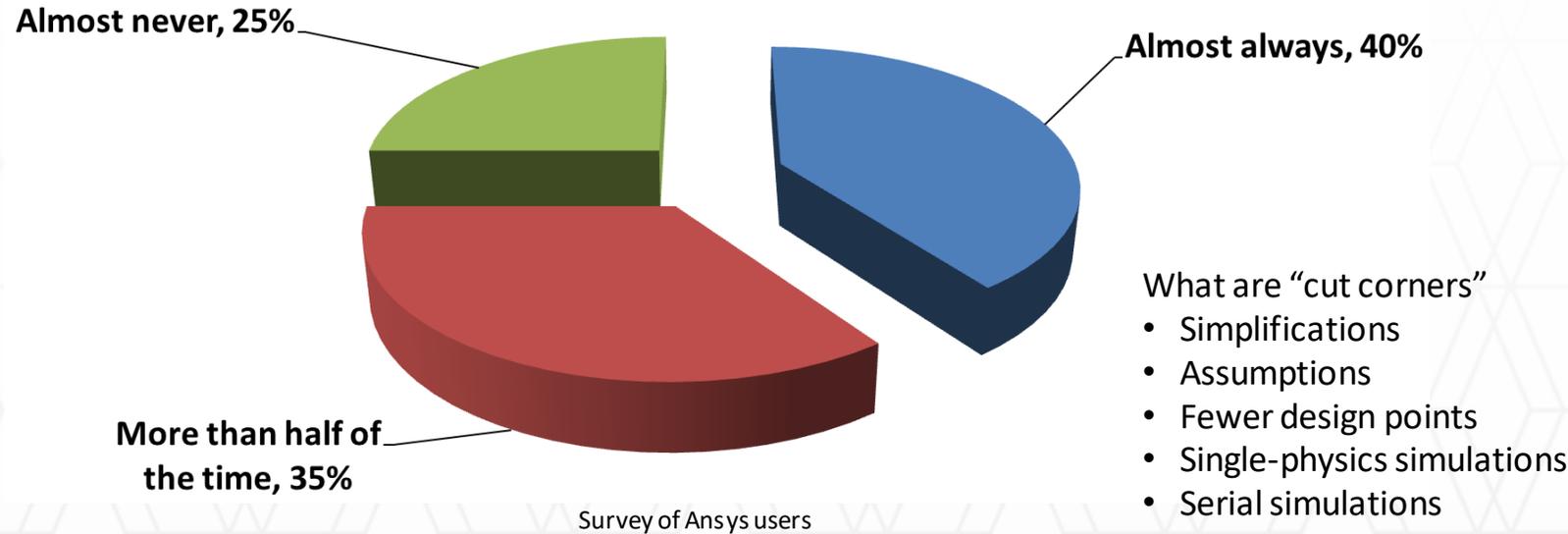
- 52 %
- 25 %
- 21 %

21%

reported that their most frequent simulations are overnight runs that take 9 hours or more to complete.

Why Cloud: Costs of being compute bound

How often do you “cut corners” due to your compute limitation?



40% of Ansys user base run simulations exclusively on a laptop/desktop!



>56% less than 36 cores

HW constraints negatively impacted simulation effectiveness for almost 75% of users



*Click to return
Agenda*

Benefits

Ansys Cloud

Ansys

Ansys Cloud increases simulation throughput by removing the **hardware** barrier. **Ansys** is the only Simulation Software vendor that has **cloud directly integrated** into our **simulation software**. We have a **secure**, **scalable** and **cost-effective** approach to **HPC in the cloud**.

Key partnership :



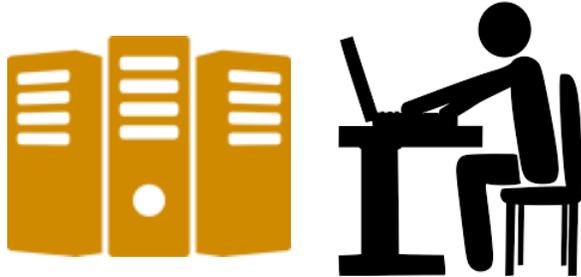
Vision :



Impacting engineering throughput

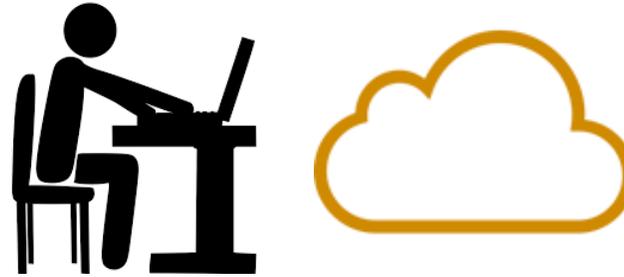
Yesterday

Using Local Resources



Tomorrow

Using Ansys Cloud + Azure Resources



Use local machine for model setup	↔	Use local machine for model setup
Use local machine for solving	↔	Use Ansys Cloud for solving
8 CPU cores	↔	132 CPU cores
32 GB RAM	↔	1,056 GB RAM
Running 1 job at a time	↔	Running 10 jobs at a time (12 cores per design point)
8 hours per design point	↔	6 hours per design point
10 design points = 80 hours	↔	10 design points = 6 hours

✓ *User Experience is identical.*

✓ *Ansys and Microsoft handle all the IT.*

Ansyes Cloud, unleash the power!

Tuned to deliver best performance

Ansyes Flagship Solvers

Local Computing

Ansyes Cloud : no speed limit !



Ansyes
CLOUD

Ansyes

The Benefits of Cloud

Increase simulation throughput

Pay for only what you use

Access the latest hardware (at scale!)

Move fixed expenses to variable (CapEx -> OpEx)

Focus on engineering (not maintaining clusters)



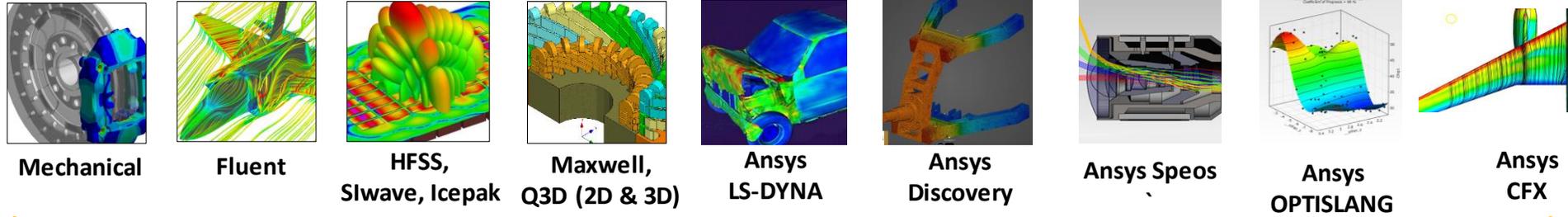
*Click to return
Agenda*

Solution

Ansys Cloud

Ansys

Ansys Cloud – “HPC as easy as it should be”



Ansys
CLOUD

Microsoft
Azure



HPC Optimized

- Better Price/Performance up to **960 cores**
- Increased flexibility for flagship solvers
- New Ansys Electronics Desktop (AEDT) Configurations and Optimization performance/cost ratio

In Browser Interactive

- Supporting Nvidia GPU
- Up to **120 cores**

New simplified pricing

- Ansys Elastic Currency
- Ansys Managed Hardware Solution

New Products

- ▶ **SPEOS** in the Cloud : More Speed & Flexibility, **Up to 60X** faster than local computing
- ▶ **DISCOVERY** in the Cloud : Bring more Physics in Browser

BENEFITS :

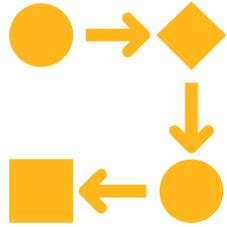
- ✓ **Solve in the cloud** directly from the desktop application
- ✓ **Highly optimized** for Ansys solvers
- ✓ **Single** vendor solution for Software and Hardware
- ✓ **Nine** data centers worldwide
- ✓ Data **localized** and **secured**

Compute Nodes

- **High memory** bandwidth
- **Large capacity** RAM
- **High performance** interconnect
 - Low latency **Message Passing Interface (MPI)**
 - **High Bandwidth**
- **Faster** working directory

Ansys

/ Ansys Cloud is HPC optimized



Workflow

Cloud access is integrated **directly** from your Ansys software. With **only a few mouse** clicks, you have the **power** of the cloud to use as you wish.



Performance

This complete solution — from solvers to the cloud — was developed by Ansys for **full architecture integration**. Like a Formula 1 race car, Ansys Cloud is **tuned** for Ansys solvers.

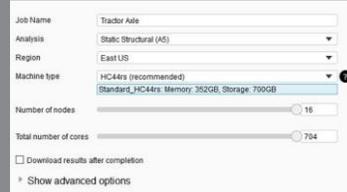


Support

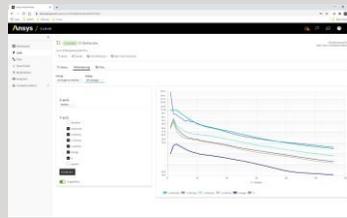
Ansys **supports the entire simulation process** from **hardware to software**, from beginning to end.

ANSYS Cloud workflow

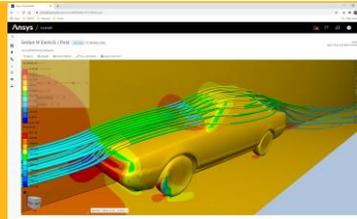
Submit jobs from desktop application



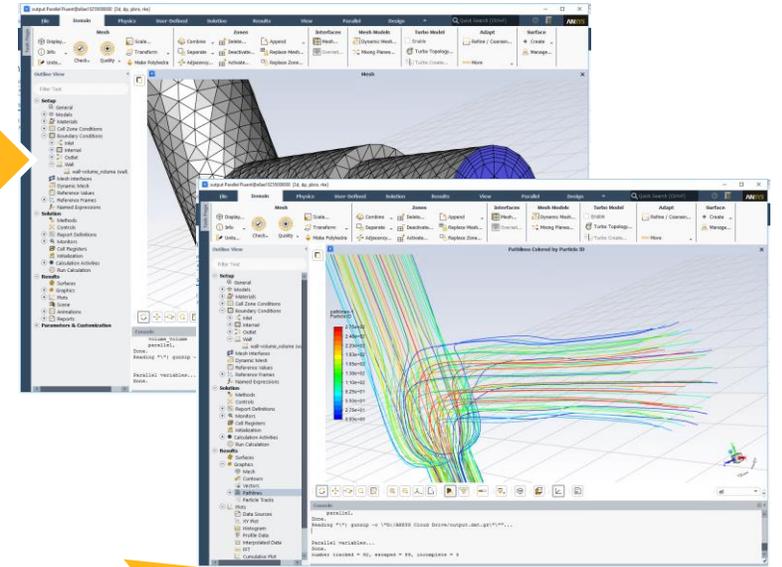
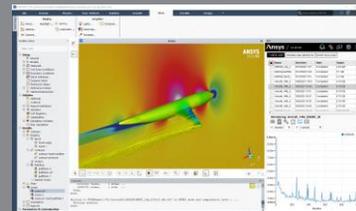
Monitor from app or cloud portal



Visualize results in the cloud

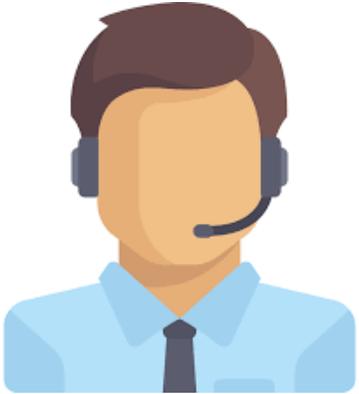


Download to workstation



Newly added!
ANSYS' In Browser Cloud Offering for interactive cloud-based workflows

 We support you !



*“I just spent few hours and walked through the desktop-remote solve and VDI workflows. We took his solve time on a single modal analysis from **8 hours down to 20 minutes**. The solver used most of the available RAM so that was probably a big factor.”*

Ansys ACE Engineer

Power of our single source of support for both HW and SW.



*“Every time you interface with an **Ansys AE** to get help with a cloud-related inquiry, there is a good chance you might walk away from the engagement with a **quick tip**, **an update** on a new feature you were not aware of, maybe some **guidance** on a better method, etc.. You can never get this level of holistic support from a CHP or DIY approach.”*

Improved Security thanks to Single Sign On (SSO)

Name	URL	SSO Enabled
Cloud Portal	https://cloud.ansys.com	✓
Cloud Forum	https://cloudforum.ansys.com	✓
Discovery Forum	https://discoveryforum.ansys.com	✓
Discovery application	N/A (desktop application)	✓
Account Portal	https://account.ansys.com	✓
Account Admin Portal	https://accountadmin.ansys.com	✓
Store	https://catalog.ansys.com	✓
Customer Portal	https://support.ansys.com	✓
Help	https://ansyshelp.ansys.com	✓
Licensing Portal	https://licensing.ansys.com	✓
Medini Portal	https://medini.ansys.com	✓
Ansys API	N/A	✓
Customer Center	https://customercenter.ansys.com	✓
Lumerical Portals	N/A	✓

Benefits

- Only 1 password / login
- More secure with Multi-Factor Authentication (MFA)
- Better protection against phishing/hackers

First step for the federated SSO

What's New ?

Ansys

CLOUD

2021 R1



HPC Optimized

- Better **Price/Performance up to 960 cores**
- Increased **flexibility** for flagship solvers
- New AEDT Configurations



Run Ansys Applications Interactively In-Browser

- Interactive cloud-based workstations: **Now running in-browser**
- New HW configurations supporting Nvidia **GPU**
- New high-core count configurations, **up to 120 cores**
- Broader product **testing/support** coverage for interactive applications in Ansys Cloud



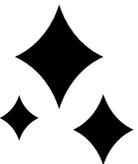
Ansys Elastic Pricing

- New “Ansys Elastic Currency” simplified pricing with a **single rate**
- **AEC – Ansys Elastic Currency** – like AEU – enables SW usage on Cloud and on prem AND enables HW usage on Cloud
- **AHC – Ansys Managed Hardware Solution** – the same as AEC (pricing, rates) except that it ONLY enables use of cloud hardware



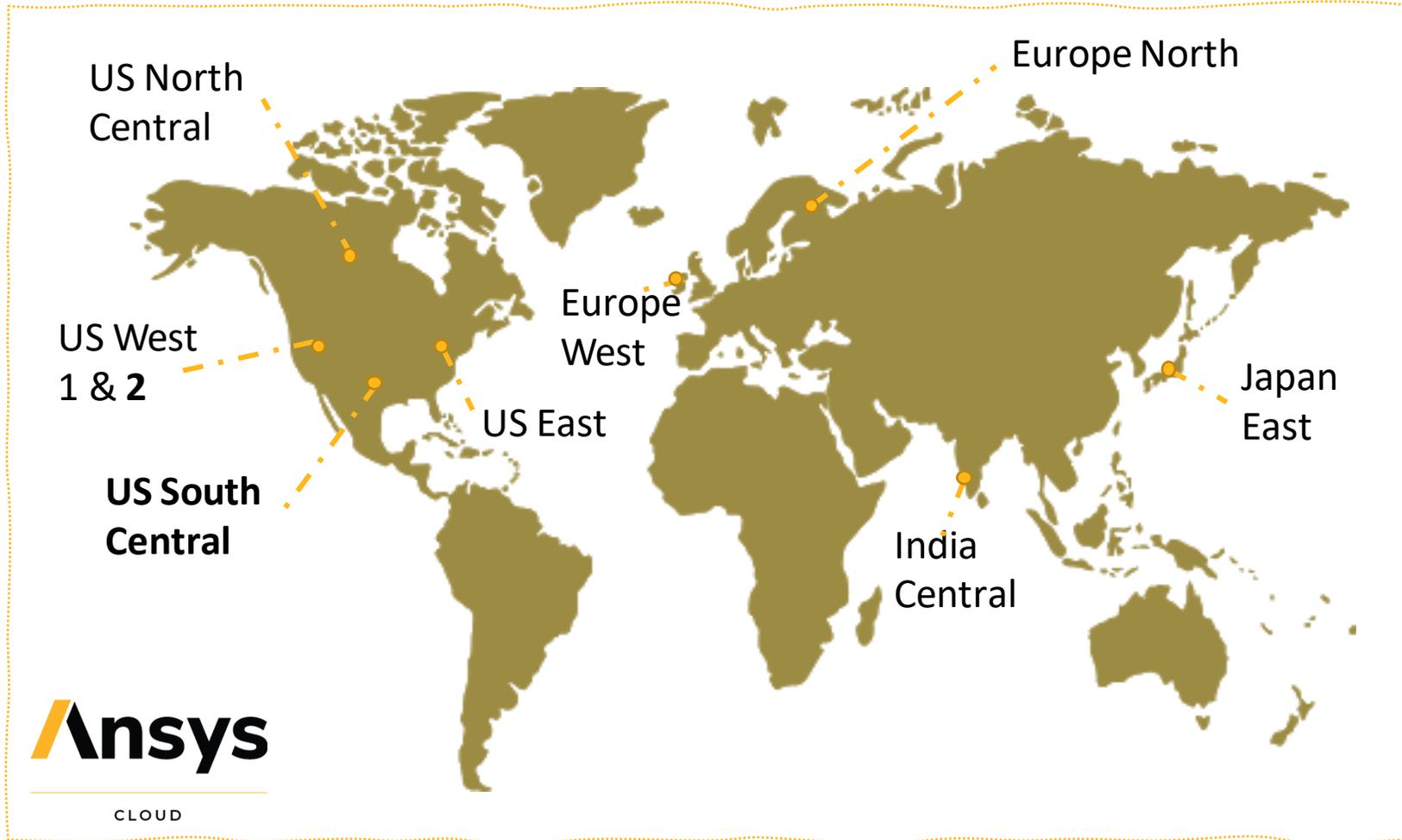
New Products

- **SPEOS** in the Cloud : More Speed , More Flexibility, **Up to 60X** faster than local computing
- **DISCOVERY** in the Cloud : Bring **more Physics in Browser** (VDI)
- Improvement in **AEDT** : **Optimize performance/cost ratio** of your simulation



Ansys

Geos for Hardware



- WW coverage
- Broader Support/training
- Pricing adapted to your geo
- Better availability
- GDPR



Secured Admin Controls & Account Settings

IT administrators can establish controls on account settings for Ansys Cloud users. In addition, Organization Administrators can configure permissions and privileges for their organization.

- Ansys Cloud uses Multi-Factor Authentication login to ensure the best security against hacking.
- All users can collaborate by using Manage job sharing.
- Organization Administrators can set other users in their org to Org. Administrators



Best-in-Class Data Encryption

Ansys Cloud uses proprietary methods and industry-standard to ensure that data is encrypted at every step of the process (both during transit and at rest).

- Encryption is used during upload and download over https and encryption-at-rest with AES-256
- Simulations always executed in customer-specific private subnets on dynamic, private clusters
- Encryption keys are securely stored in separate locations
- Ansys Cloud encrypts data before it leaves the desktop, and it is kept encrypted.
- Supported standards include custom file encryption @ AES256 and HTTPS TLS1.2



Availability & Data Center Security

The Ansys Cloud Service application is deployed in multiple regions :

- In case of service interruption, no critical data is lost due to replication.
- Physical security is deployed to secure datacenters with access request and approval, facility's perimeter and building entrance with two-factor authentication (with biometrics), professional security officers, cameras inside the datacenter and patrol but also security scan. [Learn more about it.](#)
- Isolated Compute regions. In addition to deploying shared resources in a highly redundant way, each compute region consists of only enough resources needed to successfully execute a job. It is deployed into numerous regions and a customer is offered a choice of which region to use for running simulation jobs. All customer data persist in the customer-specified region and are never copied outside of the geo.



External Certifications & Compliances

Our cybersecurity management follows industry guidelines, including ISO and NIST frameworks, for internal assessments. Ansys also work with many third-party assessments and audits throughout the year to guarantee to our customer the market-leading certifications.

- Ansys has been issued an SOC 2 Type II certification
- We are working to achieve FedRAMP and ISO27001 certification.

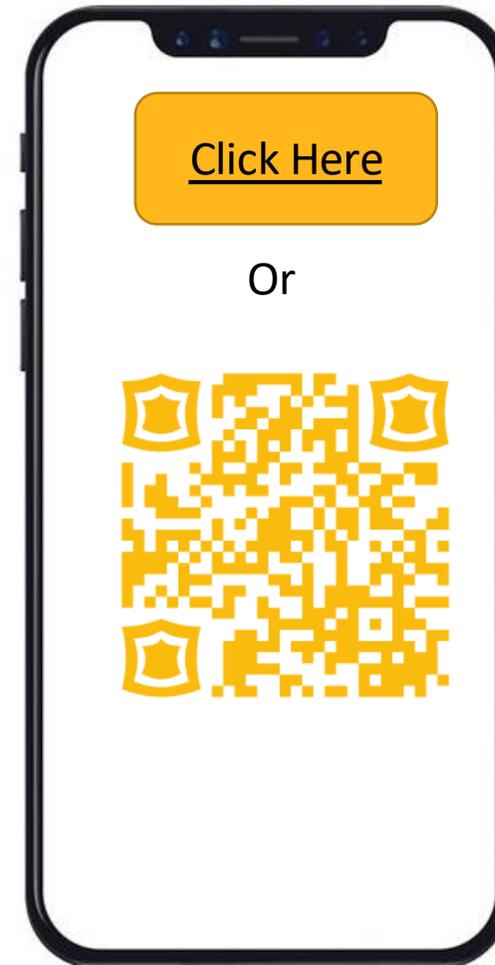


SOC 2
TYPE II
CERTIFIED

What is SOC2 ? : SOC 2 is an auditing procedure that ensures your service providers securely manage your data to protect the interests of your organization and the privacy of its clients.

Learn More about Architecture & Security

Download our Architecture and Security Overview White Paper !



New HW Configurations coming with HPC and In-Browser Interactive Client

More choice, more flexibility, more power

Infra	Cores per node	Frequency Peak	RAM per Node	Memory Bandwidth	Interconnect	
H16r	16	3.3 GHz	112 GB	80 GB/s	56 Gb/s	Current Configurations
H16mr	16	3.3 GHz	224 GB	80 GB/s	56 Gb/s	
HBv1	60	2.55 GHz	240 GB	263 GB/s	100 Gb/s	Last released
HBv2	120	3.1 GHz	480 GB	350 GB/s	200 Gb/s	
HC	44	3.4 GHz	352 GB	191 GB/s	100 Gb/s	
Nv6	6 cores, M60 GPU	NA	56 GB	NA	In Browser only	
Nv12sv3	12 cores, M60 GPU	NA	112 GB	NA	In Browser only	

HPC

In Browser

5 new HW configurations

Interconnect is up to X4

Memory is up to X4

Cores per node is up to X8

GPU Support

- ✓ Ansys' in-browser interactive client which avoids the firewall issues of RDP
- ✓ New options for interactive use with HW configurations with an Nvidia GPU (NV6, NV12s_v3)
- ✓ New high-core count interactive virtual machines (up to 120 cores on a single VM with HBv2)
- ✓ Broader product testing/support coverage for interactive use in Ansys Cloud

New In-Browser Interactive Client

New HW configurations with an Nvidia GPU + In-browser client

From 6-core up to 120 cores cloud-based workstation available in minutes

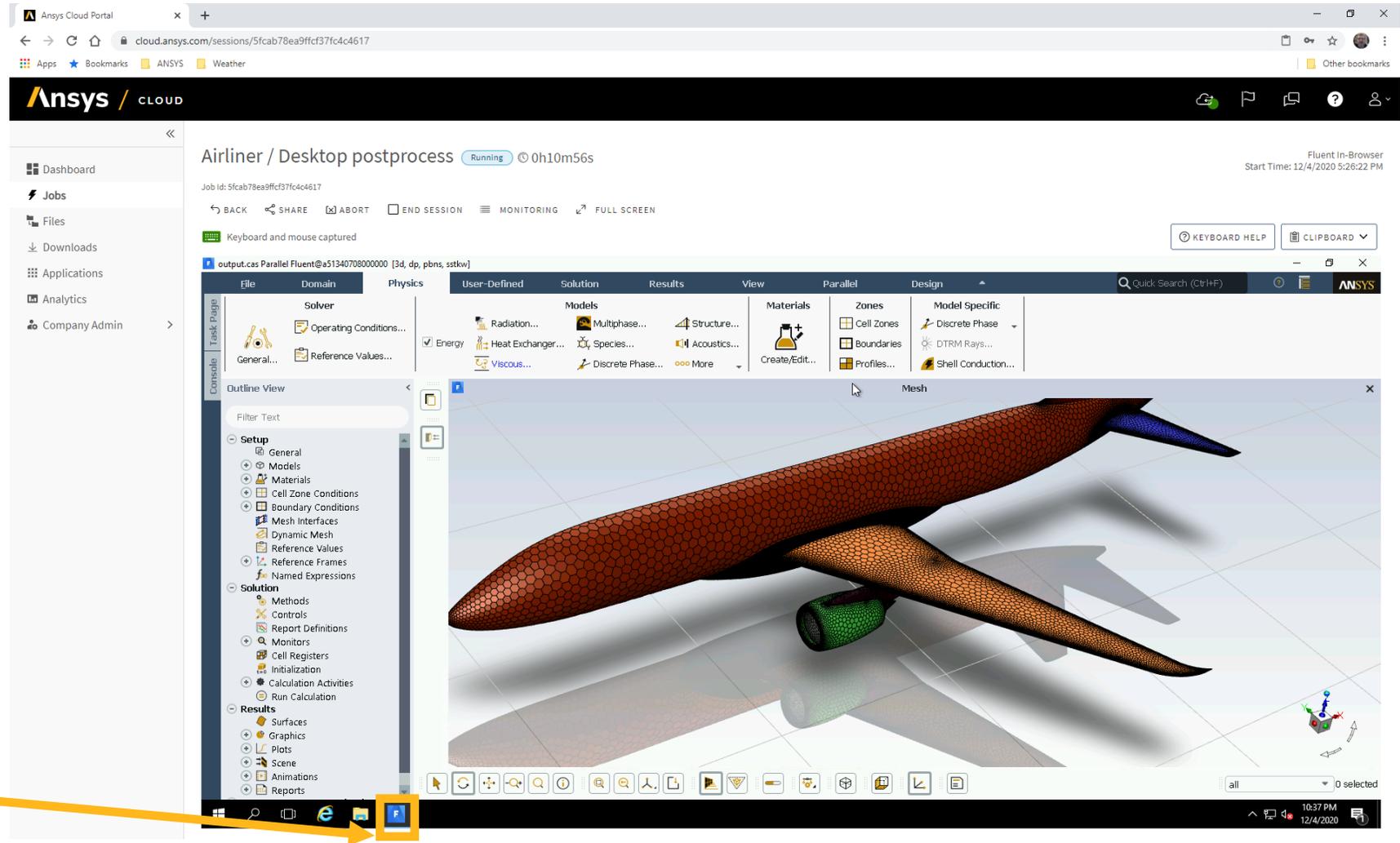
Ansys Solutions installed and ready to use

Can be used with AEC/AHC's and BYOL

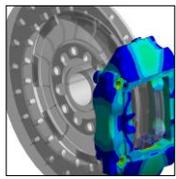
Performance optimized to ensure reduced latency

Pre or post process in the cloud or complete a full workstation solve

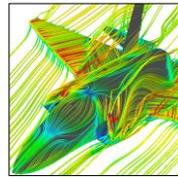
Seamless remote application experience. Feels like you are working on your local machine.



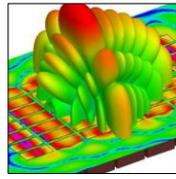
The Nodes, Clusters and Supported Products



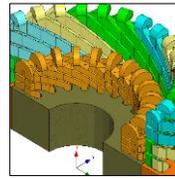
Mechanical



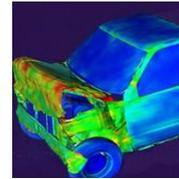
Fluent



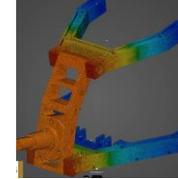
HFSS,
SIwave,
Icepak



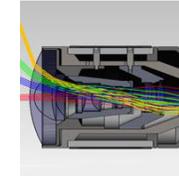
Maxwell,
Q3D (2D & 3D)



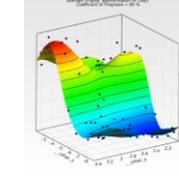
LS-DYNA



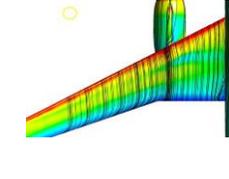
Discovery



SPEOS



optiSlang



CFX

VM

SUPPORTED Products – Batch Solve, Interactive Sessions, Command Line

Node

Mechanical

Fluent

Electronics

Discovery

SPEOS

Ansys LS-DYNA

optiSlang

CFX

LSTC LS-DYNA

H16r

FULL

FULL

FULL

FULL

FULL

VDI+CLI

VDI+CLI

H16mr

FULL

FULL

FULL

FULL

FULL

VDI+CLI

VDI+CLI

HC

FULL

FULL

FULL

FULL

FULL

FULL

VDI+CLI

VDI+CLI

HB

FULL

FULL

FULL

FULL

FULL

VDI+CLI

VDI+CLI

HBv2

FULL

FULL

FULL

FULL

FULL

FULL

VDI+CLI

VDI+CLI

NV6

VDI

VDI

VDI

VDI

VDI

VDI

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VDI

NV12sv3

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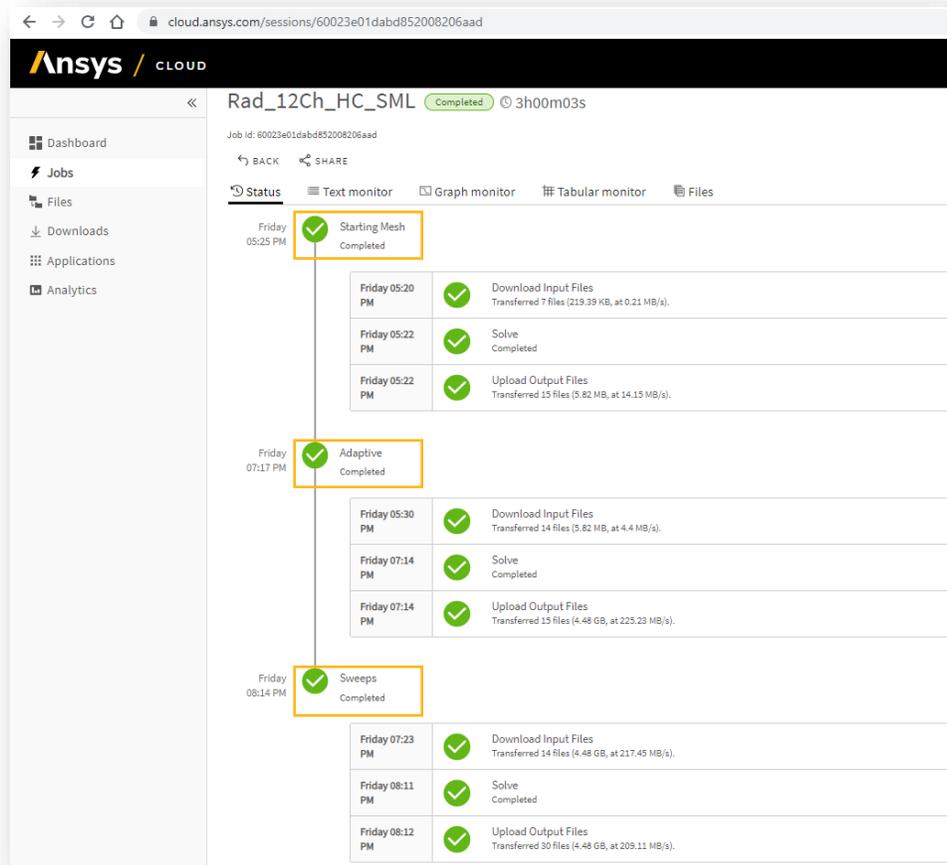
FULL = Batch
Solve & Interactive
sessions

VDI = Interactive
Sessions

VDI+CLI =
Command Line &
interactive
sessions



New 2021 R1 Features : Improved Submission in HFSS



Optimize your cloud hardware usage

Up to 38% saving on HW with multi-step submission

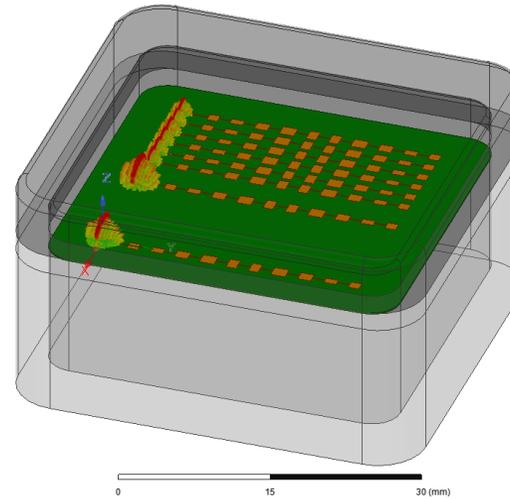
- **Monitor Job**

- When the status of the job is completed, the user can proceed with the download results process in AEDT.
- Note the 3 status of the 3 stages during the solution process, since we selected multi-step submission with 3 steps.

Optimize your simulation !

77GHz Automotive Radar with Package and Radome

- Simulation specifications
 - Medium sized problem
 - Number of excitations: 8
 - Interpolating Frequency Sweep 401 points.
 - Solution Frequency 77 GHz (Save fields).
 - Total tetrahedra: 238k
 - Matrix size: 15.6M



**Smallest Virtual Machine :
H16mr - Intel Xeon E5 v3
"Haswell". With 8 cores from the
16 available and 30% of the total
ram used (64GB)*

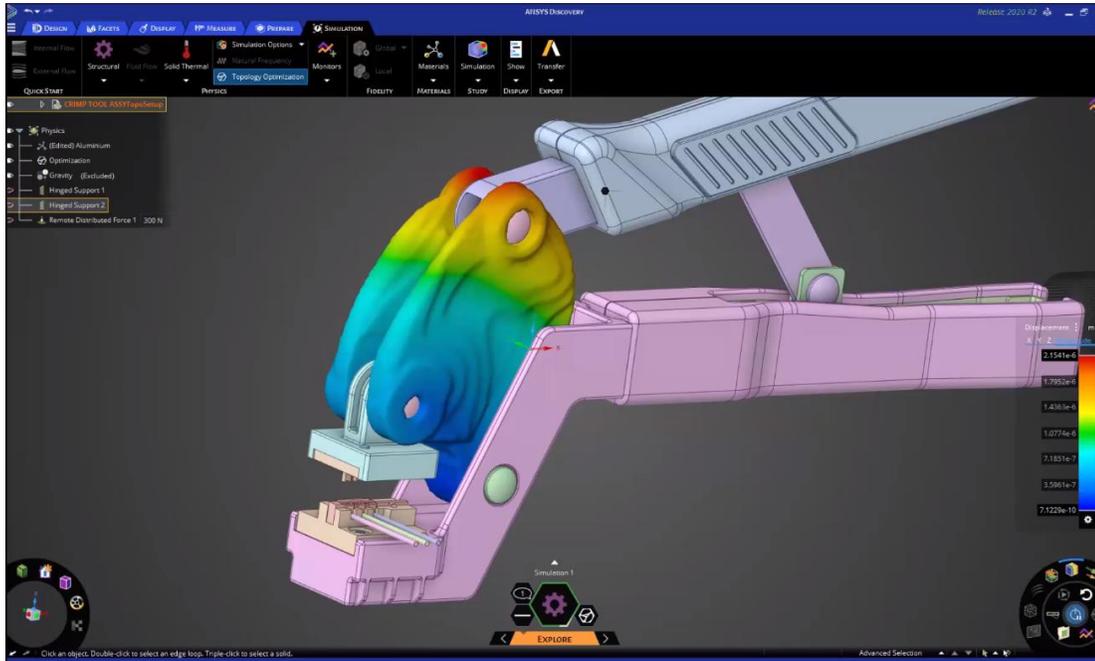
#0 : Solved in **12hrs 7min** using small 8 cores VM*

#1 : Solved in **2hrs 25min** with Ansys Cloud :
5X faster.

#2 : **Optimized** : solved in **3hrs 38 min**
and **38% AECs saving** compared to #1
thanks to **Ansys Cloud + multi steps.**

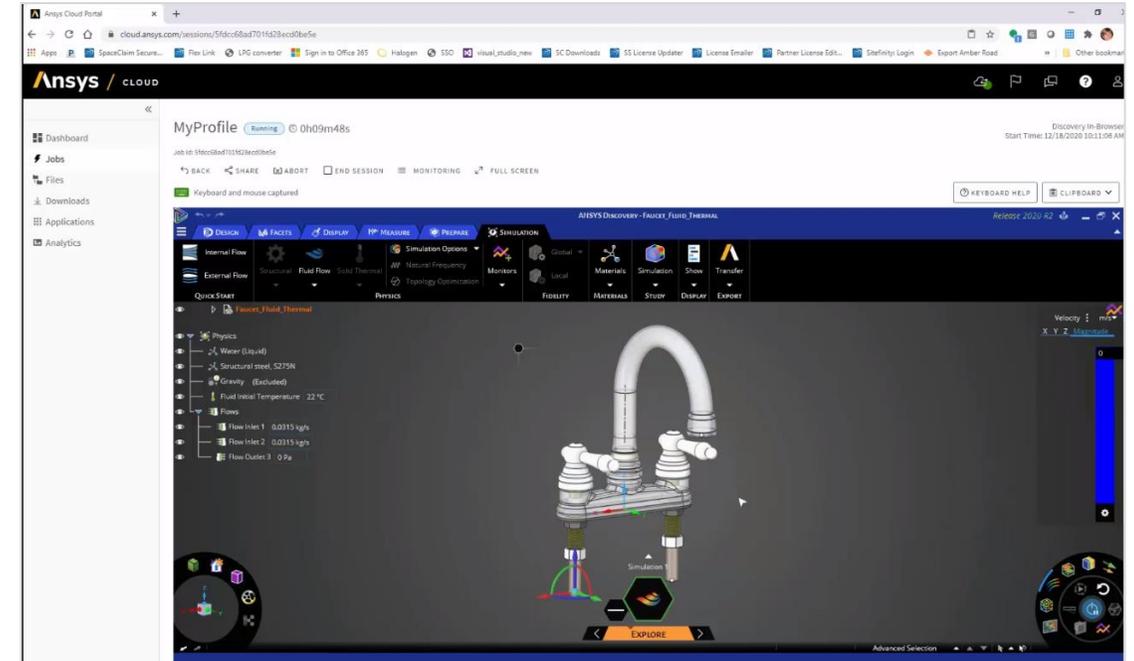
	Settings	Confs	Cores	RAM (TB)	Total Time	AECs Usage	AECs Saving [%]
H16mr	Single		8	0.064	12:07:22		
	Single	L	128	1.7	2:47:59	295.6	
H16mr	2 Step	M/L	32/128	0.448 / 1.7	3:38:44	184.5	37.7
	3 Step	S/M/L	16/32/128	.224 / .448 / 1.7	3:37:02	238	19.52
	Single	L	176	1.4	2:25:09	292	
HC	2 Step	M / L	88 / 176	.704 / 1.4	2:51:56	247	15
	3 Step	S / M / L	44 / 88 / 176	.352 / .704 / 1.4	3:07:26	247	16

ANSYS Discovery : Choose RDP or In Browser



RDP

- More immersive user experience
- Feels like a native desktop app
- Can have firewall restrictions

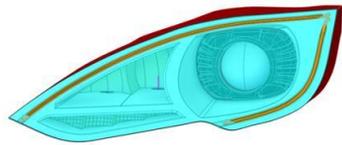
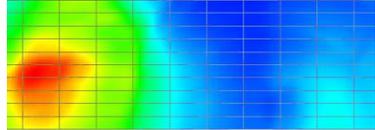


In Browser

- Easier access to the cloud portal
- Restricted access to some keyboard shortcuts
- No firewall restrictions

SPEOS Benchmark : Choose either HBv2 or HC ?

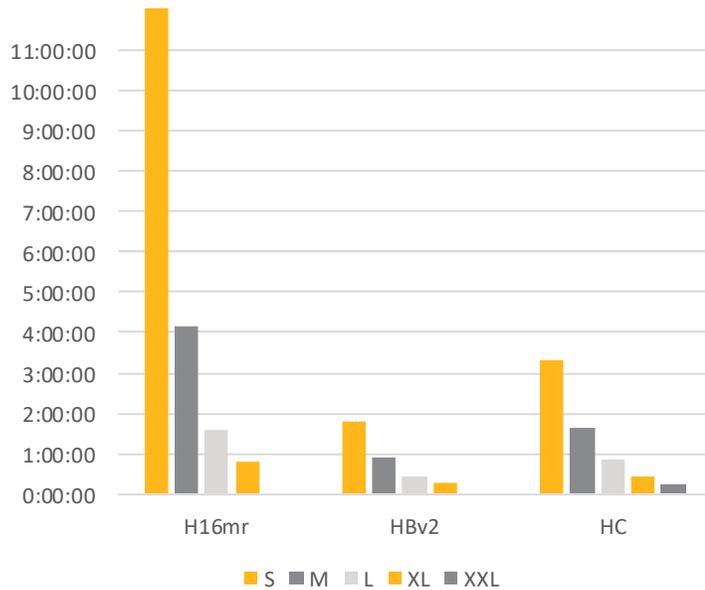
Use Case #1 : Light Guide



Direct Simulation

Number of bodies : 4
 Number of faces : 1296
 Number of triangles : 19728
 Number of rays : 1E+09

Benchmark on Lightguide



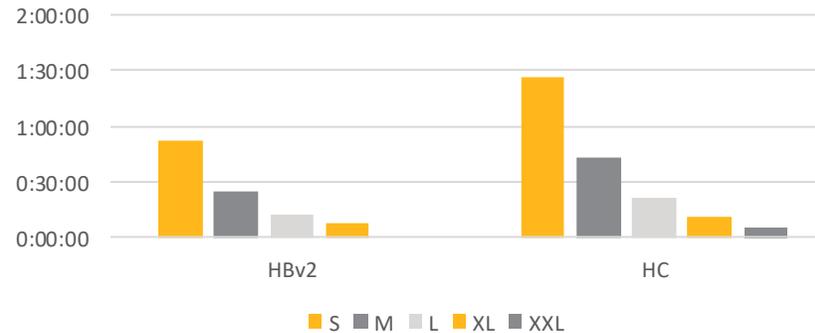
Use Case #2 : Headlamp



Inverse Simulation

Number of bodies : 64
 Number of faces : 7440
 Number of triangles : 658211
 Number of Passes : 500

Benchmark on rearlamp rendering



Number of nodes

	HBv2	HC
S	1	1
M	2	2
L	4	4
XL	6	8
XXL		16

**Virtual Machine H16 : Intel Xeon E5 v3 "Haswell" – 16 cores*

Use Case #1 takes **12h 34 min** to solve on small **16 cores VM*** where it only takes **12min with HC XXL** : Speed up to **60X** while optimizing your **cost/performance ratio***

**on this example we divided by 8 total cost by running the most powerful VMs versus the smallest one (16cores) .*



Benchmark Ansys Fluent with Ansys Cloud

Smallest VM – 16 cores*

*Virtual Machine H16
: Intel Xeon E5 v3
“Haswell” – 16 cores

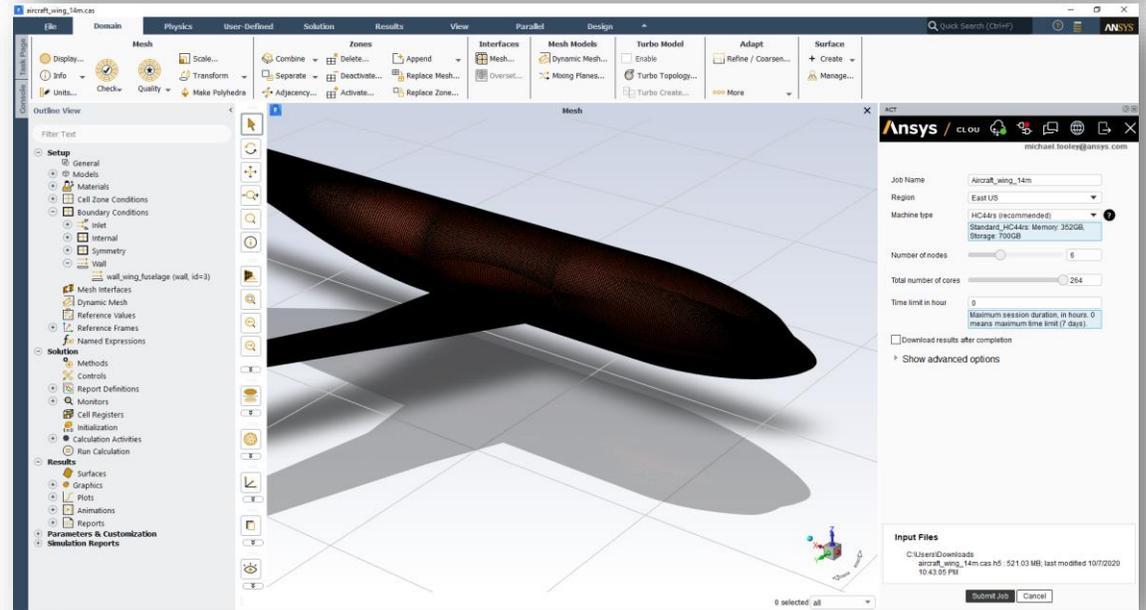
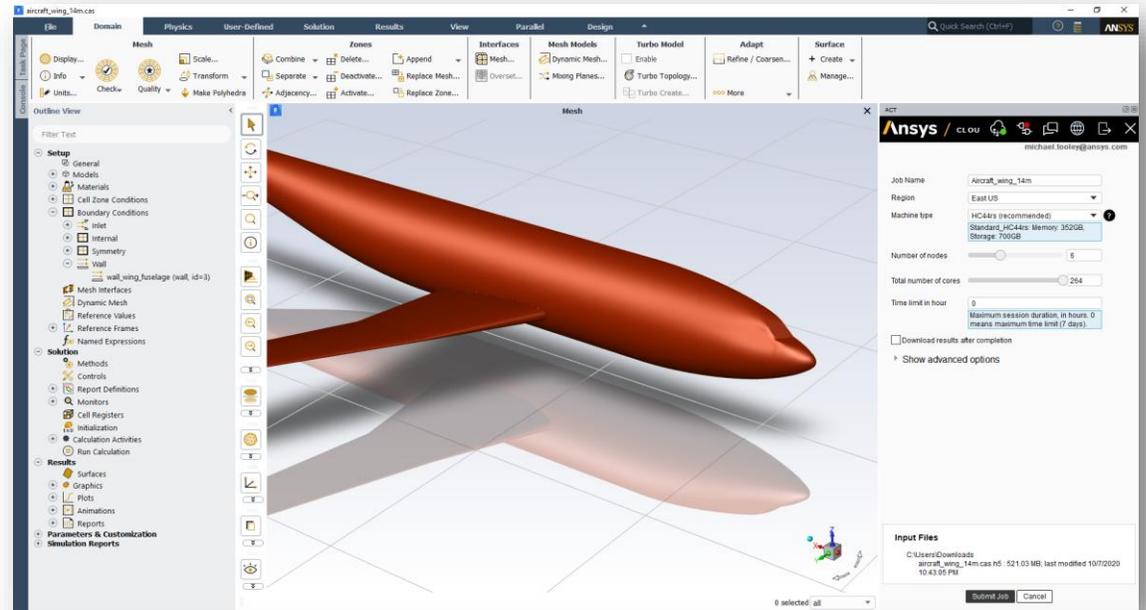


12 cores :
5 hours 27 min

Ansys
CLOUD

HC44rs 704 cores :
→ 13 minutes

- ✓ Speed up to 25X compared to H16cores VM
- ✓ Optimized Cloud cost/performance ratio



Benchmark - Ansys Mechanical with Ansys Cloud

Smallest VM – 16 cores*



16 cores : **Virtual Machine H16
: Intel Xeon E5 v3
"Haswell" – 16 cores*

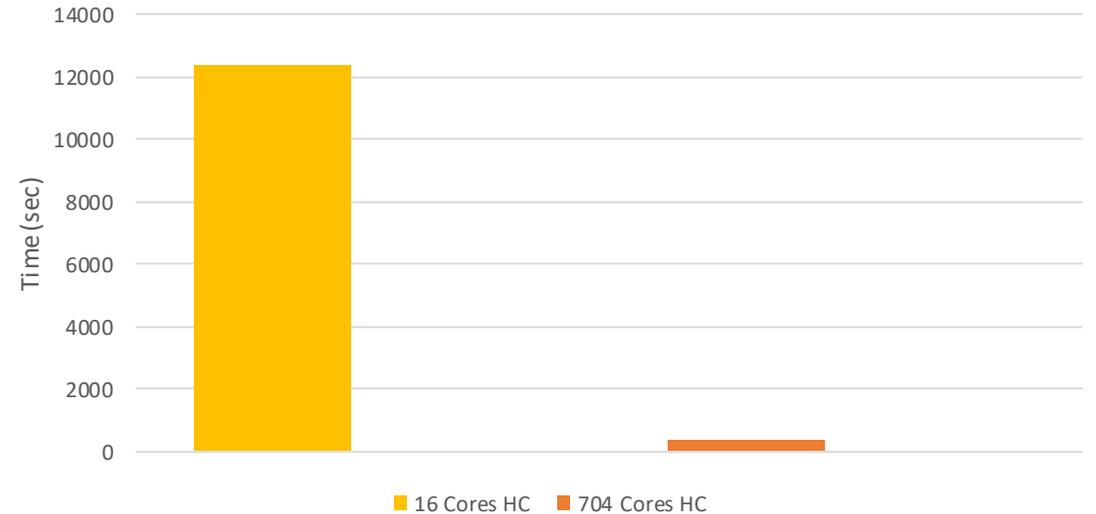
3 hours 26 min

Ansys
CLOUD

HC 704 cores :
→ **6 minutes**

- ✓ **Speed up to 26X – 35X** between H16cores VM (16 - Cores and 704 - Cores)**
- ✓ **Optimized Cloud cost/performance ratio**

Elapsed Mechanical Solver Time (sec) vs Core Count:
Speed up to 35X !



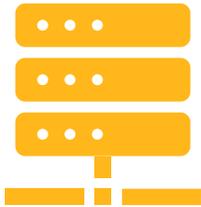
** Benchmarking done for certain number of iterations

Benchmark - LS-Dyna with Ansys Cloud

Ansys LS-Dyna
Multiphysics Solver



Use Case : 3cars
0.83 Million nodes
0.79 Million Shell Elements



44 cores (Small HC) :
29.3 minutes

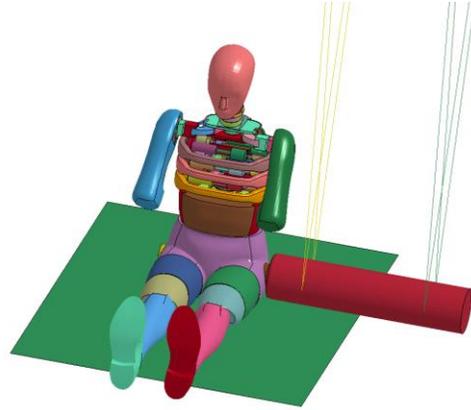
352 cores (Xlarge HC) :
7.2 minutes

4 times faster than 44
cores Virtual Machine.

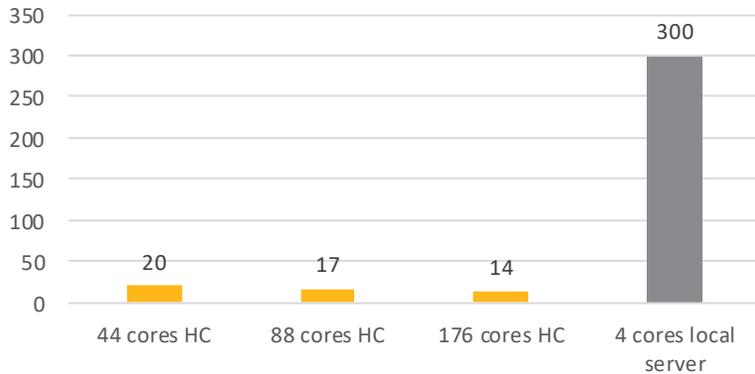
ANSYS LS-Dyna on ANSYS Cloud – Scalability Benchmark

Pelvis Crush

- 314k elements



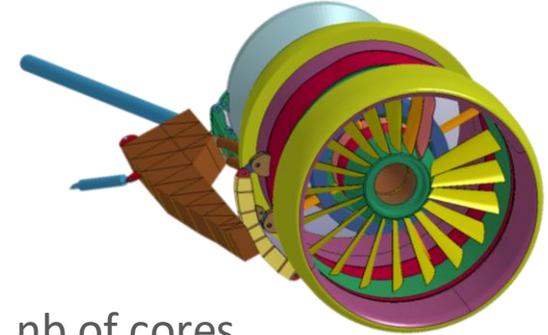
Solution Time (min) vs. nb of cores



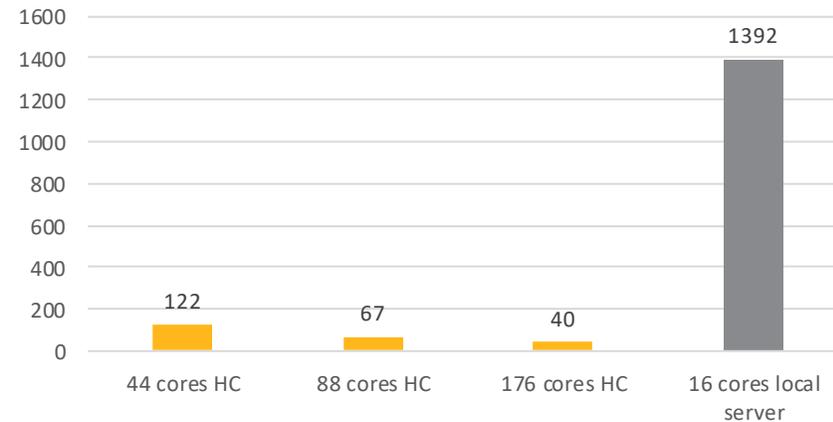
Local Workstation 4 cores : 300 min
ANSYS Cloud HC 176 cores : 14 min
Speed up : 21 X

Fan Blade Out

- 1.3 M elements



Solution Time (min) vs. nb of cores

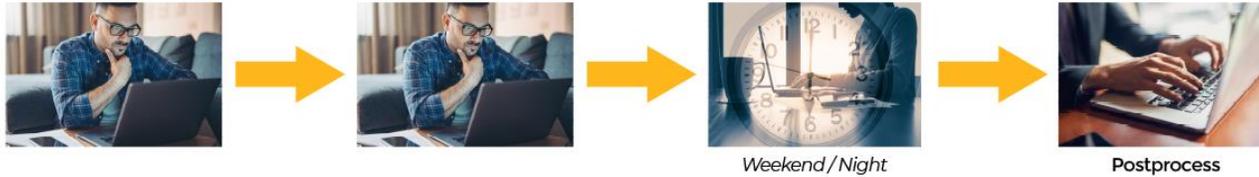


Local Workstation 16 cores : 1392 min
ANSYS Cloud HC 176 cores : 40 min
Speed up : 35 X

Ansyes optiSLang and Ansyes Cloud

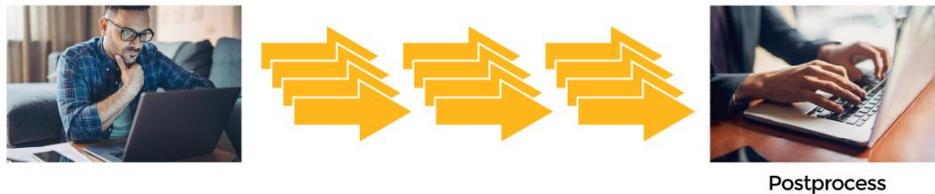
Classical

Cost: $N * \text{engineer} + N * \text{solve} + \text{postprocess}$



optiSLang + 4 parallel solve runs (local workstation)

Cost: $1 * \text{engineer} + N * \text{solve}$



optiSLang + unlimited computation in Cloud

Cost: $1 * \text{engineer} + N * \text{solve}$



With Cloud reduced the time you need to design a better product.

Reduced your simulation queue and run in parallel multi jobs



*Click to return
Agenda*

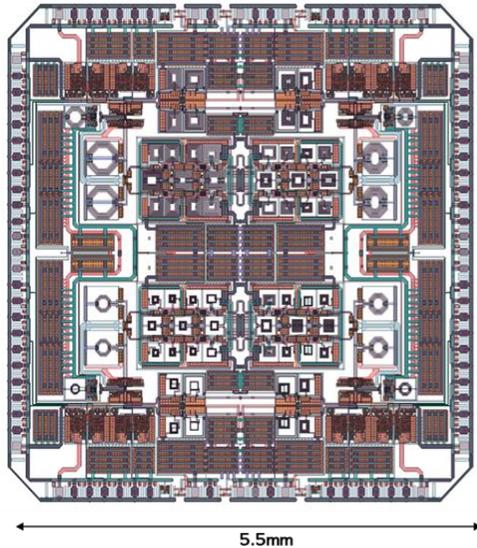
Customer Success

Ansys Cloud

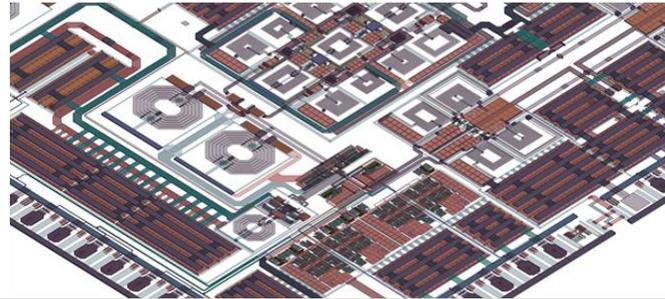
Ansys

HFSS and Ansys Cloud

It was *impossible*, until *now*. It's *true* – a *Full* Chip Solved in HFSS and Cloud!



5.5mm



Ansys HFSS has solved an entire RFIC (5.5 x 5.5mm) at 5GHz

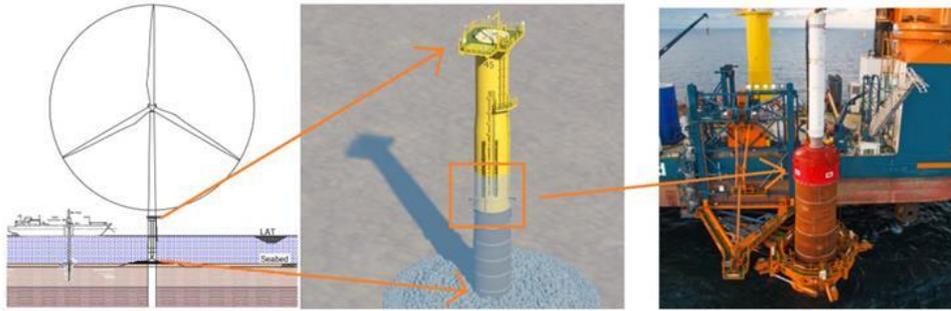
HFSS Layout automated IC-specific meshing in [Ansys HFSS](#)

[Ansys Cloud](#) on Microsoft Azure

- ✓ Compute cores used: **704 cores (Intel Xeon Platinum 8168, Azure "HC" machines)**
- ✓ RAM: **2.6TB**
- ✓ Mesh size at adaptive pass 15: **23.5M** Tetrahedron and **93M** unknowns
- ✓ Initial Mesh Time: **1h55m**
- ✓ Adaptive Mesh Time: **29h47m**
- ✓ **16-node HC VM** in Ansys Cloud gives massive RAM to solve a huge problem in HFSS for companies designing RFIC's.

"It is so rewarding to see a problem of this size and complexity solved on Azure, putting this level of HPC power in the hands of engineers when they need it the most.", says **Merrie Williamson, Microsoft VP Azure Apps and Infrastructure.**

Van Oord – Success Story with Ansys Cloud



“Van Oord engineers employ Ansys Cloud to spur new product innovation and solve the ever-growing number of Mechanical models, which may feature **over 5.5 million degrees of freedom, 1.8 million nodes and 550,000 elements.**”

“Historically, these massive models each required **150 hours to run**, however, with Ansys Cloud, our team has reduced run times to **less than 24 hours per simulation**. This has substantially sped up product development, enabled us to expediate our negotiations with foundation steel suppliers and expedited delivery to our global customers.”

Ralph Luiken, Van Oord Engineering Manager

[Van Oord and Ansys Accelerate the Design of Highly Sustainable Offshore Wind Turbines](#)

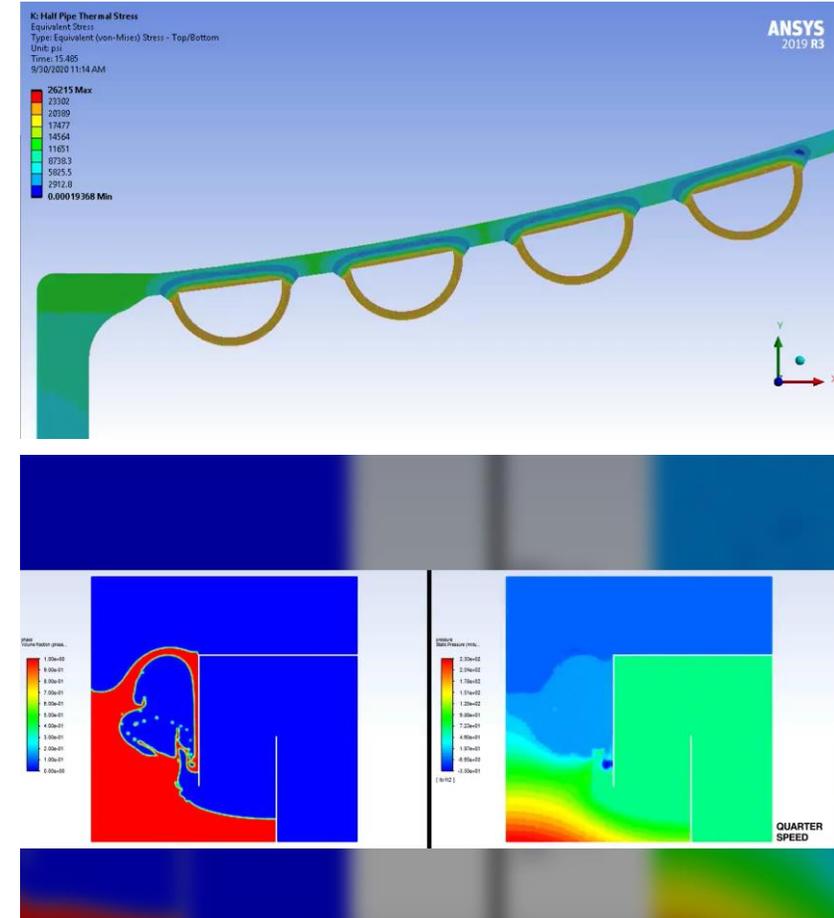
Save Time : From 7 days to 1 (Speed up 7X)

Mitigate Risk and avoid costly penalties

Capability to change the fabrication process during the project phases

Reduce HW cost

Run 5x more design iterations on Cloud



“The ability to **scale** is incredible. As a kid I grew up and never thought I would have **this power** one day. Now with Ansys Cloud I can have thousand of cores **supercomputer** at my fingertips and at a **reasonable cost**. That is very exciting. For example, I’m using it on my TV at home thanks to the **remote desktop session**. I can check my phone to see what is the status of my simulation, I can do that **anywhere**.”

“Ansys Cloud open the door for **very complex simulation** that include **Multiphysics** such as heat transfer and complex chemical reaction with 3D visualization.”

Ben Turner, Pressurized Equipment Specialist

What Customer's are Saying



« Our collaboration brings together Azure's compute and IoT capabilities with Ansys' simulation excellence to help businesses across industries transform at scale. During a time when autonomous systems are on the rise, Ansys will enable cloud engineers to increase productivity and accelerate the delivery of innovative solutions.»

Scott Guthrie, Executive Vice President, Cloud + AI at Microsoft



"Ansys Cloud has been a game-changer from a productivity standpoint. ... Ansys Cloud has reduced the time of each job from 20-25 hours to only 2-4 hours."

*Tim Marvel, P.E.
Vice President, Business Development & Technology*



"As a strategic partner and customer of both Microsoft and Ansys, our engineering teams will accelerate their product development processes with these dynamic new cloud capabilities. Adding Ansys Cloud to our existing technology infrastructure sped up our simulations by 50% and we have solved larger problems with more accuracy. Together, we are boosting engineering productivity and driving top-line impact, even while our engineers work from home."

*Scot Tutkovics, vice president, engineering operations,
Rockwell Automation*



What Customer's are Saying



"Marmon Holdings, a global industrial organization comprising 10 diverse business sectors and more than 100 autonomous manufacturing and service businesses, is adopting Ansys Cloud to make Ansys simulation technology readily available to its engineering community. On-demand access to HPC via Ansys Cloud will provide Marmon's engineering teams with simulation capacity exactly when and where it is needed."

Jeff Garascia, Chief Innovation Officer



Air Conditioning & Heating

"Ansys Cloud allowed us to tackle CFD simulations which were not practical for us to tackle before. Thanks to the flexibility and ease to access additional computational resources, we were able to solve more complicated simulations right from the Ansys GUI itself."

*-Khaled Saleh, Ph.D., P.E | Engineering Manager- Simulation Group
Goodman Manufacturing, a member of Daikin group*



"The Ansys Cloud service built into Ansys Mechanical provides intuitive, easy-to-access to HPC directly from the application. For large, high-fidelity models, Ansys Cloud reduced our solve times by 5-6X and cut the entire simulation workflow by half."

Marcos Blanco, Mechanical Simulation Engineer



What Customer's are Saying



"Ansys Cloud Compute is intuitive to use and integrates seamlessly into our Fluent workflow. Using an internet browser to check job status, view convergence plots, and pause or stop jobs we had more control of our simulations than with other cloud services, and this made our computational work much more efficient."

Adam Kline-Schoder, Flight Data Analyst



"High-efficiency equipment is critical for improving plant performance in the oil and gas industry. Ansys Cloud enables Hytech Ingenieria to calculate large and complicated geometries within hours, instead of days or weeks -- resulting in significant time savings."

Luis Baikauskas, Process Engineer



"Cloud computing is the new standard for engineering analysis. Ansys Cloud provides an easy-to-use option for quick access to cloud HPC directly from within Ansys applications. This is especially useful for businesses with variable simulation workloads."

Bert Blocken, Professor





*Click to return
Agenda*

Pricing & Packaging

Ansys Cloud

Ansys

Ansyes Cloud Essentials Subscription



Essentials Cloud Subscription : Your Named ticket to use Ansys Cloud.

FLIGHT	DESTINATION	PASSENGER	FLIGHT	
Ansys Airline ANSS PASSENGER	Ansys Cloud	M. Customer	Ansys Airline ANSS PASSENGER	
M. Customer		<i>Business Class</i>	M. Customer	
GATE A22	DEPARTURE 3:15 PM 15 DEC 2010	BOARDING ZONE D3	SEAT 24C	DEPARTURE 3:15
TRACKING 2 207 365 3958 3309 0	DATA 00 I78 D	OPTIONS 1ST CL	OPTIONS 1ST CL	
Ansys / CLOUD			Ansys / CLOUD	

Available for :

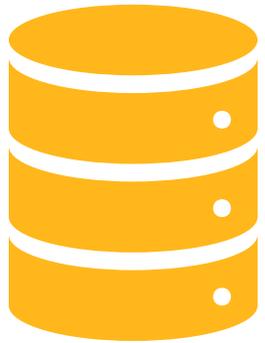
- 3 months
- 12 months

It includes :

- Support
- Geo replication
- 1TB of Free Cloud Storage
- Data Transfert



/ Ansys Cloud Extra Storage



**Add more
storage on
Ansys Cloud**

Extend your Ansys Cloud Storage on demand when you need it.

**Subscription
available for :**

- 3 Months
- 12 months

Increment of 1 TB (1000 GB) of Cloud Extra Storage

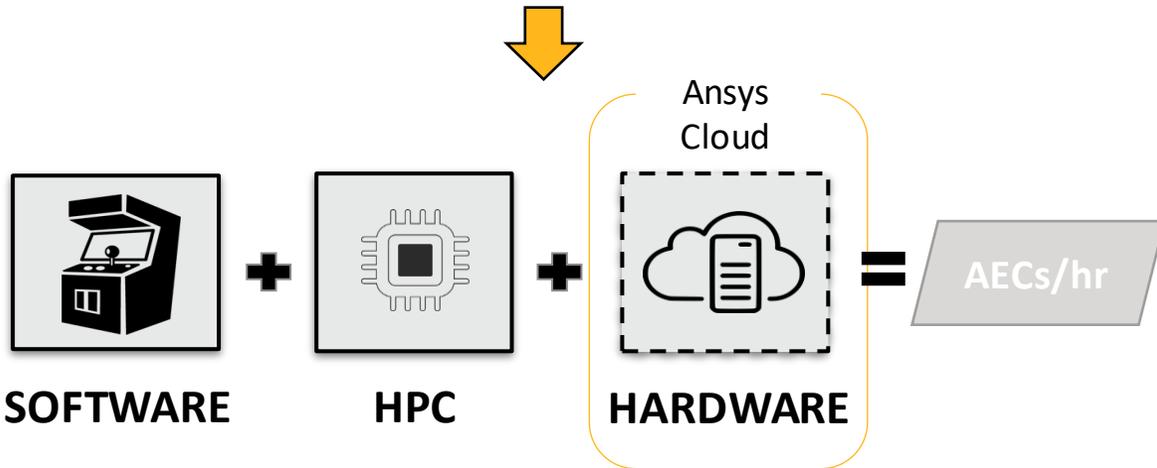


NEW Ansys Elastic Currency/ Ansys Managed Hardware Solution

Ansys Elastic Currency (AEC)

AEC can license SW, HPC and HW

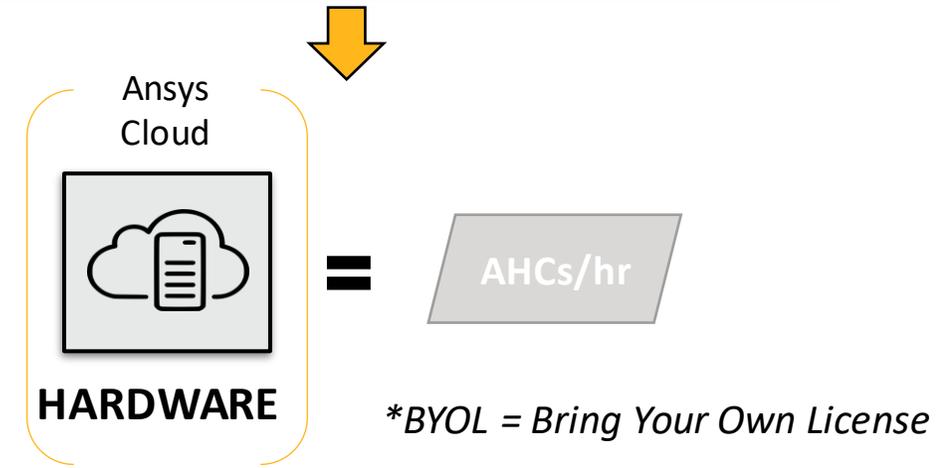
- SW + HPC + HW workflow on Ansys Cloud
- SW + HPC workflow on your existing hardware



Ansys Managed Hardware Solution (AHC)

AHC can license Ansys Cloud Hardware

- BYOL* + HW workflow on Ansys Cloud



- ✓ Successor to Ansys Elastic Unit (AEU): Similar cost, simplified pricing, and no WAN uplift
- ✓ AEC: Ansys Elastic Currency: Enables SW usage anywhere AND enables HW usage on Ansys Cloud
- ✓ AHC: Ansys Managed Hardware Solution: Same rates as AEC but focus HW usage on Ansys Cloud
- ✓ **All new sales will be AEC/AHC.** AEU's remain supported through end of term.

/ How Ansys Cloud is priced ?

1 Purchase your Ansys Cloud Starter Pack : 5000 currencies + Cloud Essentials Subscription

2 Select your **Hardware**

3 Select the number of nodes/cores :
HPC Licensing

4 Select the solver : **Software**

6
IF You already have licenses and HPC licensing, use your currencies to pay with Ansys managed hardware (AHC)

Bring your own License (BYOL) and HPC Licensing

5
Use your currencies to pay with Ansys Elastic Currency (AEC)
1 currency = 1AEC

Step 2, 3, 4 are hourly rates [see full list](#)

How to track AEC usage ?

Entitlements > Elastic Licensing

- Entitlements
 - Leases/Perpetuals
 - Elastic Licensing
- Elastic Reporting
 - Usage Transactions
 - Summary Statements
- Elastic Preferences
 - Access Credentials
 - IP Settings
- Messages
 - Emails

Active Entitlements										
Entitlement	Count	Start Date	Expiration Date ↓	Remaining Days	Total	Remaining	Currency	Used Percentage	Rate Table	
ANSYS Elastic Units - PrePay Act-629795-20210104_161953-ELASTIC-20210104_161954	500,000	2021-01-04	2022-01-04	331	500,000	487,827.5	AEU	2%	3.17	

Inactive Entitlements										
Entitlement	Count	Start Date	Expiration Date ↓	Remaining Days	Total	Remaining	Currency	Used Percentage	Rate Table	
ANSYS Elastic Units - LARGE pack 754e-8ed4-c8a6-4f80-8158-b950-5234-603e	4	2019-12-04	2020-11-26	EXPIRED	128,000	11,303.7	AEU	91%	3.17	
ANSYS Elastic Units - LARGE pack 9ddf-ccca-8bc0-4349-bcd1-9e30-84ce-55ae	4	2019-11-27	2020-12-31	EXPIRED	128,000	61,935.5	AEU	52%	3.17	
ANSYS Elastic Units - LARGE pack a89d-7932-8e89-4946-b144-f8fa-64a2-305d	4	2019-11-27	2020-12-31	EXPIRED	128,000	128,000	AEU	0%	3.17	

Transactions > Usage Transactions

- Entitlements
 - Leases/Perpetuals
 - Elastic Licensing
- Elastic Reporting
 - Usage Transactions
 - Summary Statements
- Elastic Preferences
 - Access Credentials
 - IP Settings
- Messages
 - Emails

Last received transaction: 2021-02-08 11:21:14 (refresh) ⚠ Transactions may be delayed by up to 30 minutes

From: 2021-02-08 To: 2021-02-09 Active Sessions

Start Time	End Time	Product	Count	Hours	Cost	Currency	Username	Hostname	Project	Session ID
2021-02-08 07:13:41	2021-02-08 07:15:29	ANSYS Cloud Hardware	7	0.03	0.2	AEU	_azbatch	af9f8f8df348486ab80b4d6b29470cba000000.omaewzk0ccczm4empe3kkbu0b.bx.internal.cloudapp.net		ba6dbaca-2f6a-4216-8199-401c801
2021-02-08 07:14:06	2021-02-08 07:15:22	ANSYS Mechanical Enterprise Solver	1	0.02	0.3	AEU	_azbatch	af9f8f8df348486ab80b4d6b29470cba000000.omaewzk0ccczm4empe3kkbu0b.bx.internal.cloudapp.net		4083_af9f8f8df348486ab80b4d6b29400000.omaewzk0ccczm4empe3kkbu0b.bx.internal.cloudapp.net
2021-02-08 07:14:10	2021-02-08 07:15:19	ANSYS HPC	12	0.02	0.2	AEU	_azbatch	af9f8f8df348486ab80b4d6b29470cba000000.omaewzk0ccczm4empe3kkbu0b.bx.internal.cloudapp.net		4083_af9f8f8df348486ab80b4d6b29400000.omaewzk0ccczm4empe3kkbu0b.bx.internal.cloudapp.net
2021-02-08 08:23:07		ANSYS Cloud Hardware	8		2.4	AEU	PoolAdmin1994172764	ada7f1933000000		bd6f7a3f-6a59-4413-ba22-467a148
2021-02-08 08:28:26	2021-02-08 08:36:28	ANSYS SpaceClaim	1	0.13	0.5	AEU	grjuxogf	ada7f1933000000		9615dda7-fcfe-40d5-bd6b-9ad6dct7
2021-02-08 08:37:06	2021-02-08 08:40:13	ANSYS CFD PrepPost	1	0.05	0.1	AEU	grjuxogf	ada7f1933000000		9615dda7-fcfe-40d5-bd6b-9ad6dct7



Packaging and Hourly Rates



Ansys Elastic Currency (5000) = 5000 AECs



Ansys Managed Hardware Solution (5000) = 5000 AHCs

OR Ansys Elastic Currency (AEC)

Ansys Managed Hardware Solution (AHC)

Consumption Rates for HW

Node Type	Cores per Node	RAM per Node (GB)	GPU	Target Physics	Node Hourly Rate*	Workload	Currency
Hardware Licensing							
H16r	16	112	-	Fluids	1.83	Batch	AHC AEC
H16mr	16	224	-	Mech, Elect	2.00	Batch Interactive	AHC AEC
HC	44	352	-	All	4.94	Batch Interactive	AHC AEC
HB	60	240	-	Mech, Fluids	3.56	Batch	AHC AEC
HBv2	120	480	-	Mech, Fluids	7.38	Batch Interactive	AHC AEC
NV6	6	56	M60	All	1.78	Batch Interactive	AHC AEC
NV12sv3	12	112	M60	All	2.34	Batch Interactive	AHC AEC

Consumption Rates for SW and HPC

Product Category	Hourly Rates	Currency
Software Licensing		
Geometry Interfaces	2.5	AEC
Optimization	5	AEC
Pre/Post & 3D Design	10	AEC
Solvers	20	AEC
HPC Licensing		
HPC (n cores)	$\text{int}(5 * n^{0.57})$	AEC

**Example for US East.*

**The Node Hourly Rates values vary by region (see [full list](#)).*

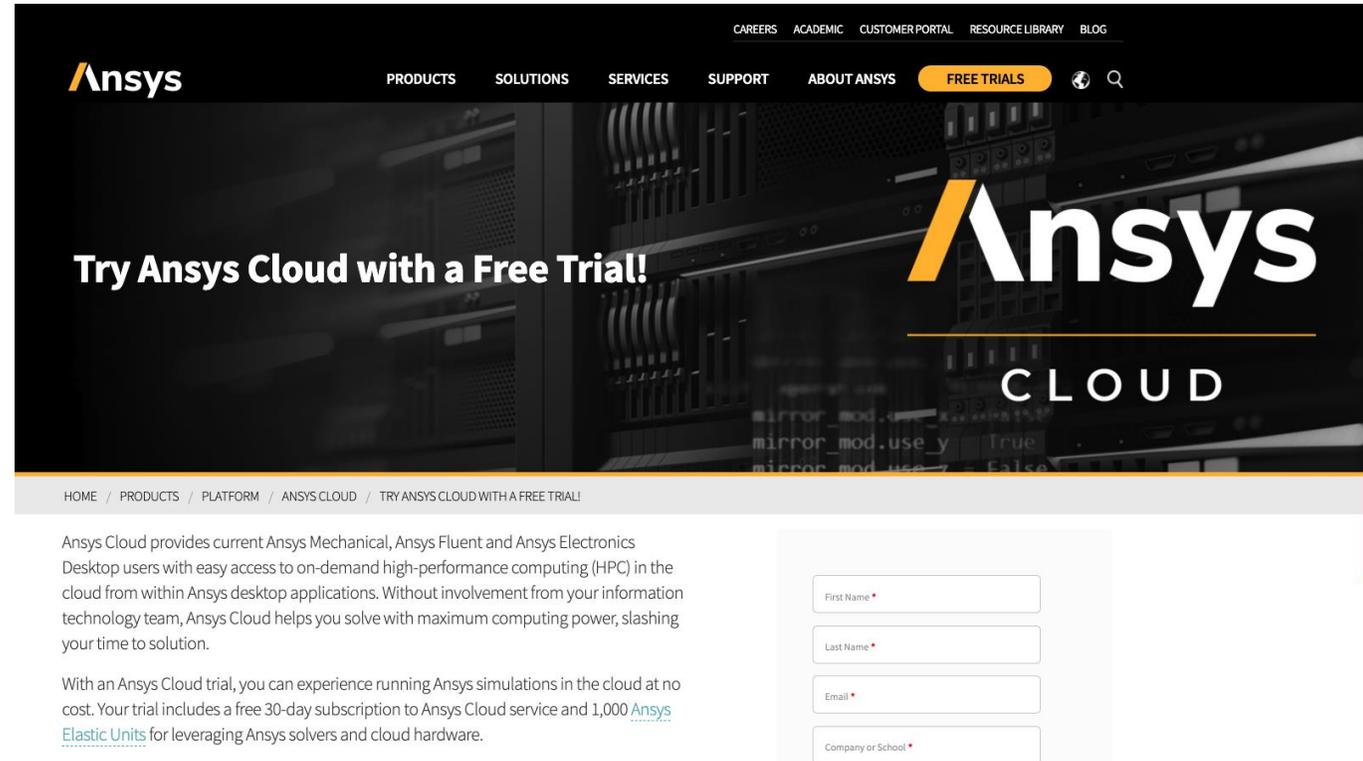


Ansys Cloud FREE Trial

What is included?

- ✓ Access to all machine configurations
- ✓ In Browser Interactive Session (start Ansys Cloud in browser) or directly in your Ansys application desktop (GUI).
- ✓ 1 TB Storage
- ✓ Access the **Cloud portal** to monitor your jobs and consumption.
- ✓ Get **support** on Cloud Forum and with our support team.

Request your free Ansys Cloud trial today!

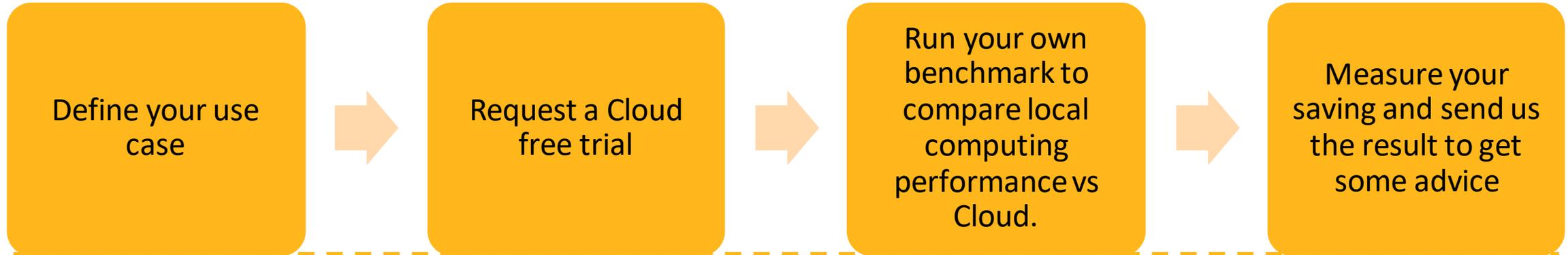


The screenshot shows the Ansys Cloud website. At the top, there is a navigation bar with links for CAREERS, ACADEMIC, CUSTOMER PORTAL, RESOURCE LIBRARY, and BLOG. Below this is a main navigation bar with links for PRODUCTS, SOLUTIONS, SERVICES, SUPPORT, ABOUT ANSYS, and a highlighted FREE TRIALS button. The main content area features a large banner with the Ansys logo and the text "Try Ansys Cloud with a Free Trial!". Below the banner, there is a breadcrumb trail: HOME / PRODUCTS / PLATFORM / ANSYS CLOUD / TRY ANSYS CLOUD WITH A FREE TRIAL!. The main text describes the trial: "Ansys Cloud provides current Ansys Mechanical, Ansys Fluent and Ansys Electronics Desktop users with easy access to on-demand high-performance computing (HPC) in the cloud from within Ansys desktop applications. Without involvement from your information technology team, Ansys Cloud helps you solve with maximum computing power, slashing your time to solution." It also states: "With an Ansys Cloud trial, you can experience running Ansys simulations in the cloud at no cost. Your trial includes a free 30-day subscription to Ansys Cloud service and 1,000 [Ansys Elastic Units](#) for leveraging Ansys solvers and cloud hardware." On the right side, there is a form with four input fields: First Name, Last Name, Email, and Company or School.

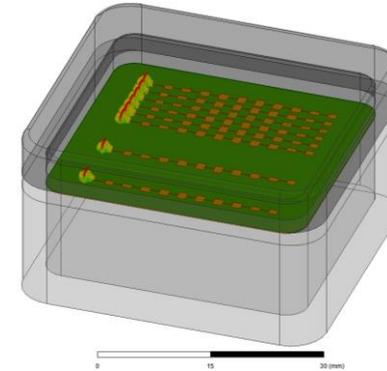
➔ www.ansys.com/cloud-trial



Bring your own Benchmark !!



Example : HFSS Frequency Sweep Extraction Scaling Benchmark



Hardware	Server				
Cores	16	16	32	128	256
RAM (GB)	256	224	448	1800	3600
Total time	3:42:13	2:15:59	1:58:28	1:15:00	1:10:23

3.2x faster!
2 hrs. 31 min time savings!

ACT
ANSYS / CLOUD
judd.kaiser@ansys.com

Job Name: MyJob
Region: East US
Machine type: HC44rs (recommended) ?
Standard_HC44rs: Memory: 352GB, Storage: 700GB
Number of nodes: 16
Total number of cores: 704
 Download results after completion

ANSYS / CLOUD
judd.kaiser@ansys.com

Job Name: My Job
Analysis: Static Structural (B5)
Region: East US
Machine type: HC44rs (recommended) ?
Standard_HC44rs: Memory: 352GB, Storage: 700GB
Number of nodes: 3
Total number of cores: 132
 Download results after completion
▶ Show advanced options

- ✓ NEW UI with possibility to change number of nodes, total number of cores
- ✓ Access the recommendation for your solver on Ansys Cloud Forum

Choosing performance-optimized hardware configurations for Fluids jobs

Updated 3 days ago

You now have multiple options for the virtual machine types to be used for Fluids HPC jobs. In this article, we'll share a sampling of benchmarking that Ansys has done with the Fluent application in order to help guide you in making these choices.

Choosing performance-optimized hardware configurations for Mechanical jobs

Updated 3 days ago

You now have multiple options for the virtual machine types to be used for Mechanical HPC jobs. In this article, we'll share a sampling of benchmarking that Ansys has done with the Mechanical application in order to help guide you in making these choices. The data shown in this article corresponds to analyses using the MAPDL solver. For results relevant to Ansys LS-DYNA, refer to [this article](#).

Choosing performance-optimized hardware configurations for Ansys LS-DYNA jobs

Updated 3 days ago

You now have multiple options for the virtual machine types to be used for ANSYS LS-DYNA jobs. In this article, we'll share a sampling of benchmarking that Ansys has done with in order to help guide you in making these choices.

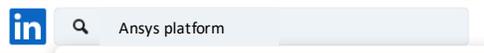
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Follow us on
LinkedIn

1

Search "Ansys Platform"

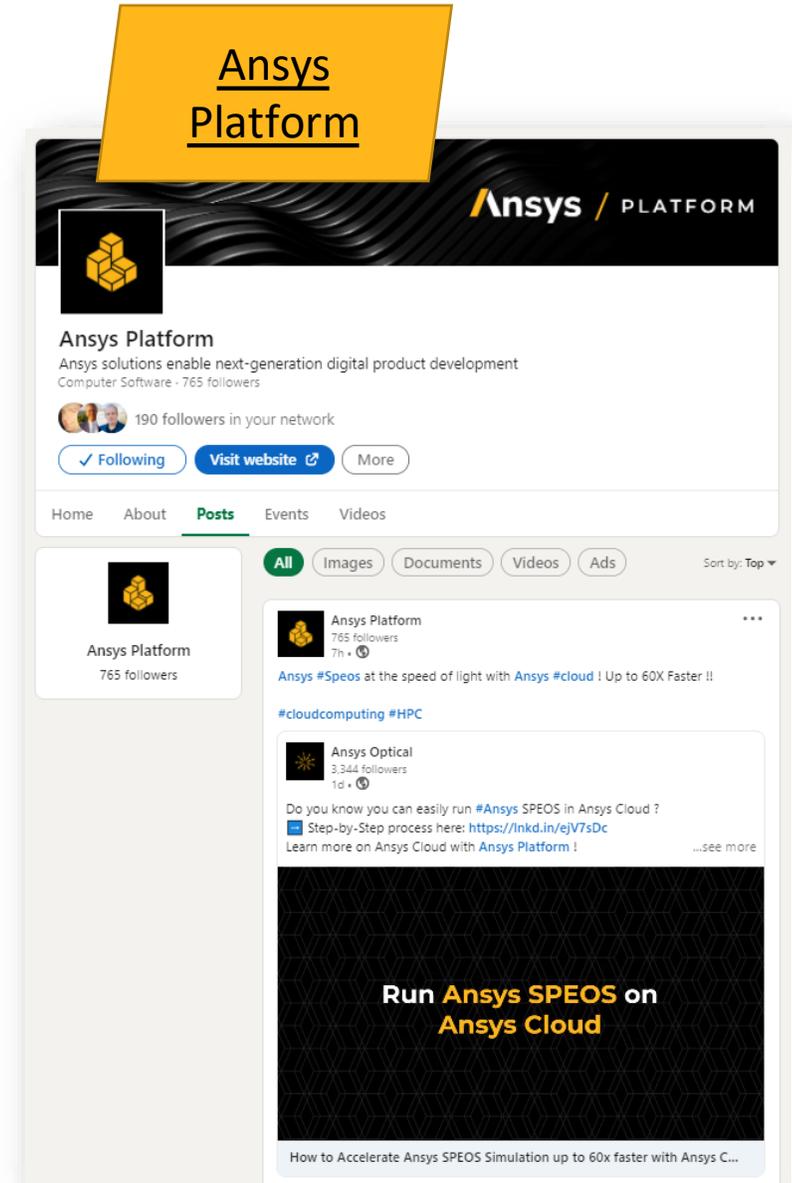


2

Hit "Follow"



Or Scan



The Ansys logo consists of a yellow slanted bar followed by the word "Ansys" in a bold, black, sans-serif font.

Ansys





*Click to return
Agenda*

Extra Slides

Ansys Cloud benchmarks & Security slides

Ansys

/ How often do you limit the size in your simulation ?

How Often do you limit the size and amount of detail in your simulation models due to turnaround time limitations ?

How Often does this need to limit your simulation details lead to low fidelity results that are less useful to your design experiments ?

*2021 Ansys Surveys with 750+ IT Managers and Engineers & C-Levels

*This has a **direct impact on the quality of results**, with 20% of the respondents reporting that limiting the simulation details always leads to **less useful DOEs**, and **52% indicating less useful results more than half of the time.***

What's Matter ?

1

Collaborate with other team members (56%);

2

Ability to burst out to the cloud when additional compute capacity is needed, equally ranked (53%) with the ability to integrate and sync simulation results with other enterprise applications (CAD/PDM, PLM, MBSE);

3

Ability to perform simulations from multiple ISVs (51%)

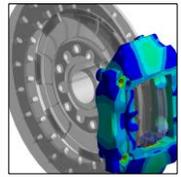
4

VDI support (49%)

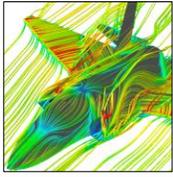
56%

responded that collaborating with other team members via cloud-enabled capabilities was very important

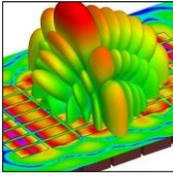
Ansys Cloud – “HPC as easy as it should be”



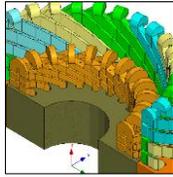
Mechanical



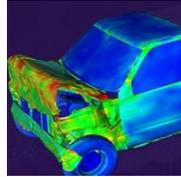
Fluent



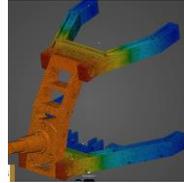
HFSS,
SIwave,
Icepak**



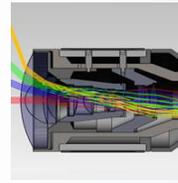
Maxwell*,
Q3D (2D & 3D)*



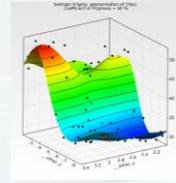
Ansys
LS-DYNA***



Ansys
Discovery



Ansys Speos



Ansys
OPTISLANG



Supported Versions

- ✓ Ansys 2019 R2
- ✓ *Ansys 2019 R3
- ✓ **Ansys 2020 R1
- ✓ ***Ansys 2020 R2
- ✓ ****Ansys 2021 R1

BENEFITS :

- ✓ **Solve in the cloud** directly from the desktop application
- ✓ **Highly optimized** for Ansys solvers
- ✓ **Single** vendor solution for Software and Hardware
- ✓ **Nine** data centers worldwide
- ✓ Data **localized** and **secured**

Compute Nodes

- **High memory** bandwidth
- **Large capacity** RAM
- **High performance** interconnect
 - Low latency **Message Passing Interface (MPI)**
 - **High Bandwidth**
- **Faster** working directory

Cloud Interface – Fluent/Mechanical



Cloud Interface in application

File transfer Agent status

- Green – running, ready
- Red – Stepped
- Yellow - busy

Cloud Connection status

- Green – Connected
- Red – not connected

Forum

Sign out

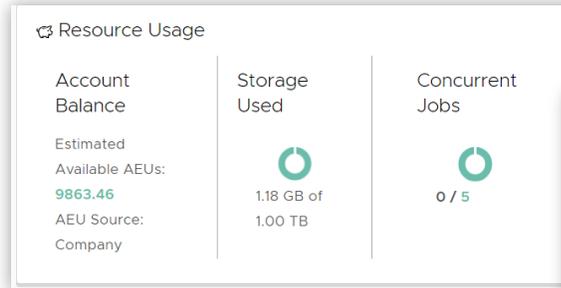
Exit app

Account logged in

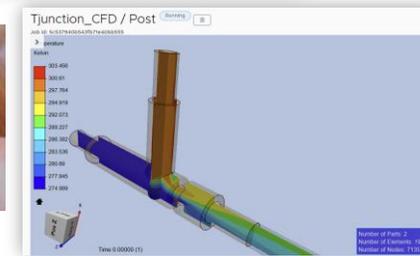
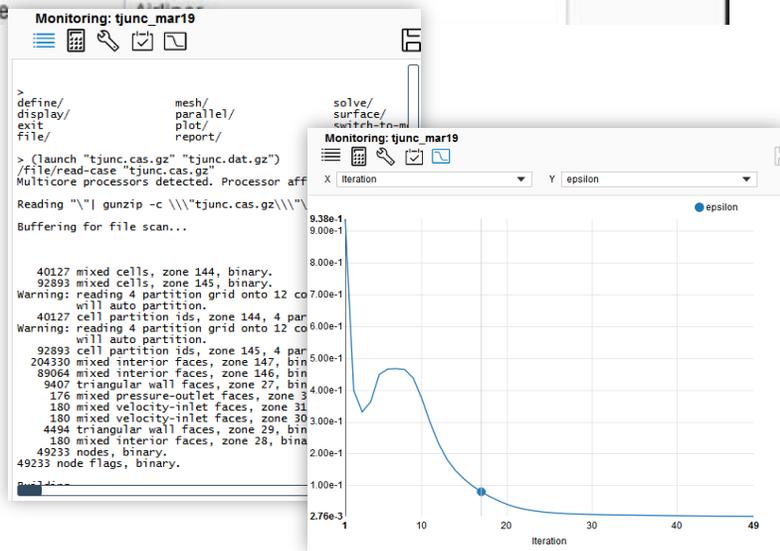


Ansys Cloud Portal:

- Job management
- Analytics and dashboards,
- Postprocessing
- App download



Name	State	Start Time	Finish
BoltedBracketFEA	Running	1/31/2019 4:29:10 PM	N/A
Tjunction_CFD	Running	1/31/2019 4:27:51 PM	N/A
BoltedBracket2019R1	Completed	1/17/2019 11:35:01 AM	1/17/2019 11:35:01 AM



Other Features

Command Line Interface (CLI)

ANSYS Cloud CLI
Command line interface to submit jobs

[Installation](#)

[Commands](#)

- [Login](#)
- [Logout](#)
- [GetQueue](#)
- [RunMAPDL](#)
- [RunFluent](#)
- [RunAedt](#)
- [JobInfo](#)
- [GetOutput](#)
- [JobState](#)
- [deleteJob](#)
- [Monitor](#)

```
Microsoft Windows [Version 10.0.10240]
(c) 2015 Microsoft Corporation. All rights reserved.

C:\Users\akumar>AnsysCloudCLI login
ANSYS Cloud CLI
.....
Version 1.0.1901.20
Identity: https://login.microsoftonline.com/tfp/ANSYSAccount.onmicrosoft.com/B2C_1_Account_sign_in_trafficmg/oaauth2/v2.0/authorize
Apps: https://cloud-api.ansys.com/Application/
Monitoring: https://cloud-api.ansys.com/Monitoring/
Resource: https://cloud-api.ansys.com/Resource/

1 /rc tjunc191_oct2.cas.gz
2 /solve/initialize/hyb-initialization yes
3 (set-input-parameter-value "temp_hot" 320)
4 (set-input-parameter-value "temp_cold" 280)
5 (set-input-parameter-value "vel_hot" 0.2)
6 /solve/iterate 50
7 /wcd tjunc191_%.cas.gz
8 (set-input-parameter-value "temp_hot" 340)
9 /solve/iterate 50
10 /wcd tjunc191_%.cas.gz
11 (set-input-parameter-value "temp_hot" 360)
12 /solve/iterate 50
13 /wcd tjunc191_%.cas.gz
14 exit
15 yes
16
```

Customers can collaborate or seek help

The screenshot shows the Ansys Cloud Portal interface. A yellow box highlights the 'SHARE' button in the 'Cloud Desktop' section. An arrow points from this button to a 'Share BoltedBracket2019R1 session' dialog box. The dialog box contains an email field with 'judd.kaiser@ansys.com' entered, a message field with 'Hello Judd, Here are the results. Please review and advise. Thanks.', and 'CANCEL' and 'SHARE' buttons.

SPEOS on Ansys Cloud

Faster Simulation



- **Easily** submit a simulation job on Ansys Cloud to speed up your simulation
 - Select the closest data center
 - Select the Queue from Small to XLarge Up to **x60 Faster**
- Access Ansys SPEOS from the Cloud Desktop (interactive cloud-based workflow)
- Combine SPEOS with other Ansys Products:
 - Mechanical
 - Fluent
 - optiSLang
- Compatible with Elastic Currency or BYOL

Job name:

Select region:

Simulation performances

Configuration:

Applications

Interactive session



15/09 à 17:44 Upload Input Files
Transferred 3 files (16.32 MB, at 6.1 MB/s).

15/09 à 20:43 Compute
Completed

15/09 à 17:49 Download Input Files
Transferred 3 files (16.32 MB, at 26.59 MB/s).

15/09 à 20:43 Solve
Completed

15/09 à 20:43 Upload Output Files
Transferred 7 files (107.99 MB, at 95.57 MB/s).

Download Output Files



Ansyes SPEOS HPC & Ansyes Cloud

Quickly evaluate systems at extremely high resolution faster than ever before



Fast | Accelerate your simulation **time up to 60x faster***



Easy | Single-click access to the Ansyes Cloud



Flexible | Pay only for what you use



Huge HPC Cluster
720 Cores

NIGHT
10 hours



HPC Cluster
240 Cores

WEEKEND
2 days



Small Cluster
120 Cores

WEEK
5 days



Small VM
16 Cores

MONTH
30 days

**Than a classic 16 cores VM with Intel Xeon E5 v3 "Haswell"*



The Value of Ansys Discovery on the Cloud



Do you want to try Discovery before purchasing (expensive) HW?

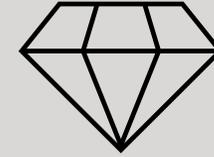
Do you already have Discovery, but you want to do more for some peek usage?

Are you facing HW limitations ?



Solution

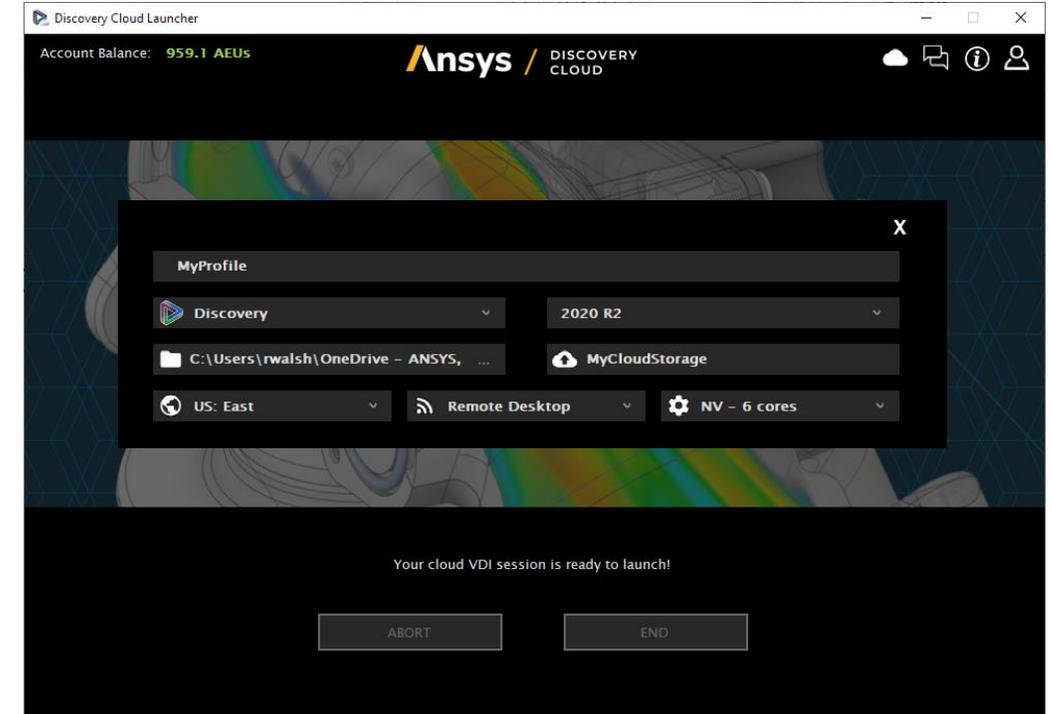
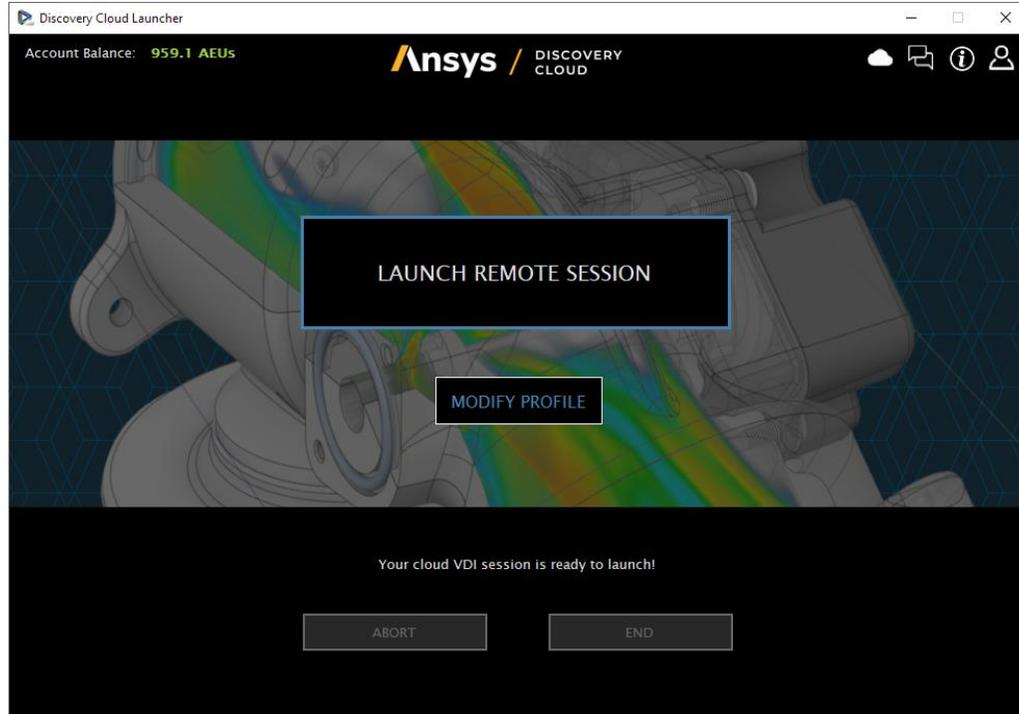
Discovery on the Cloud



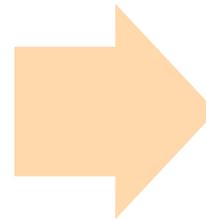
Benefits

- Access
- Flexibility
- Scalability

Cloud Launcher



Access Discovery on the cloud with one click



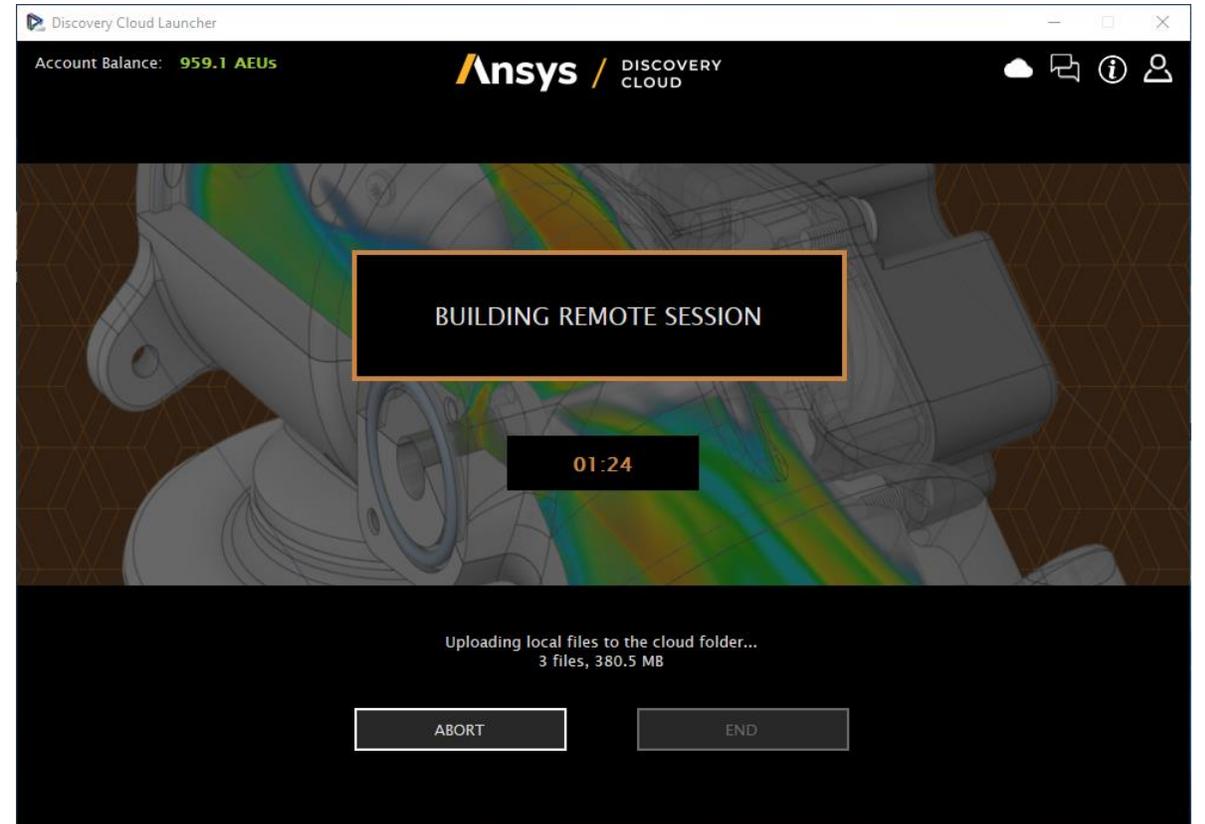
Modify your profile to specify region, version, and file upload/download locations

Launching Discovery

After launching Discovery, local files will be securely transferred to the specified cloud location

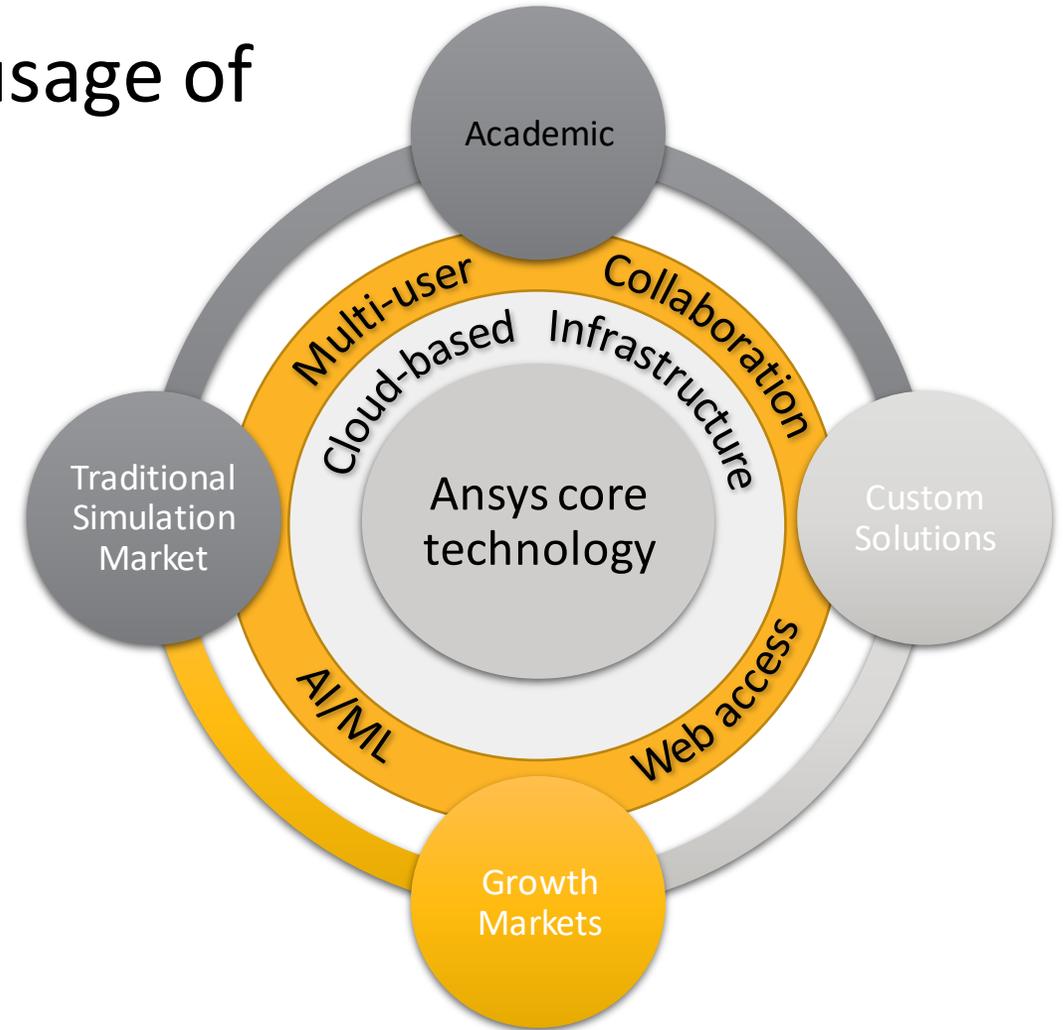
After files are uploaded, the VDI session will be launched

Total time for the will depend on the size of files being uploaded



The power of Cloud to increase the usage of Ansys technologies

- Unlock simulation needs currently limited by lack of resources or access
- Deliver a consistent and feature rich HPC experience across the full suite of Ansys applications supporting both on prem and cloud
- Enable complete in cloud workflows
- Provide foundational elements enabling Ansys to deliver targeted solutions outside of the conventional simulation ecosystem



Microsoft and Ansys Partnership

"We are and always will be partner led"
-Satya Nadella, CEO Microsoft



Autonomous

Ansys

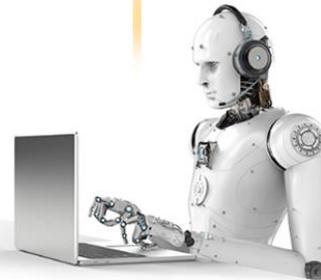
CLOUD



5G Planning



STEM & e-learning



AI/ML

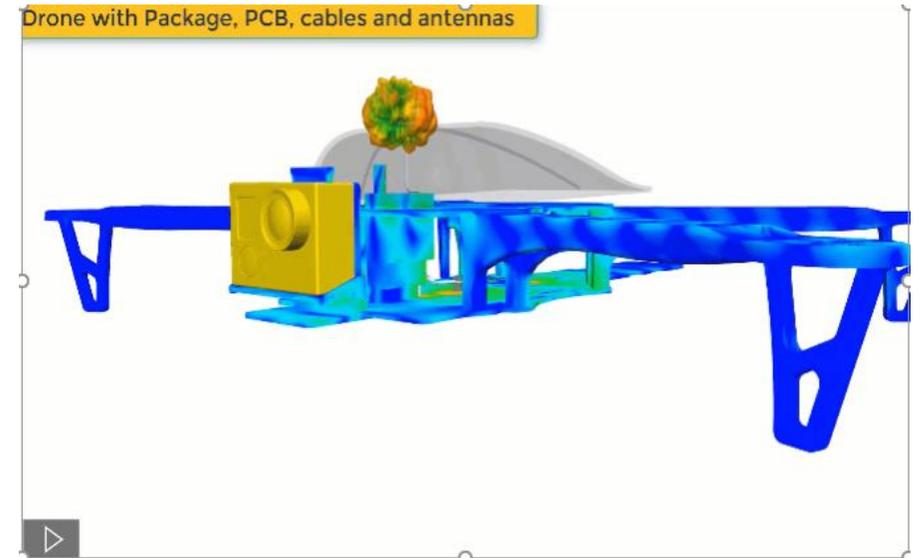


Digital Twins

- Microsoft partnership is key to Ansys' digital transformation strategy
- Microsoft Azure selected for the Ansys Cloud platform
- **Ansys Cloud** services are foundational for all cloud-based applications

Ansyes Cloud and Electronics

- **Complexity:** Smaller form factors plus higher data rates and frequency content demand more complex, and comprehensive, products to be designed and simulated
- **System:** Electronics content is growing and will continue to do so. Large system level simulations needed to understand interaction, intended or otherwise
- **Scale up and optimize:** Cloud capacity provides ability to rapidly simulate design points to optimize designs and understand yields
- **Risk mitigation:** Cloud capacity turns simulation weeks to days and days to hours allowing rapid design iteration which will minimize the chance of design failure
- **Ansyes electronics workflow:** Tight integration of HFSS to Cloud with easy access to HPC resources or ability to run HFSS from your browser



Cluster Specs

VM	CLUSTER SPECS		
Node	Max Nodes	Max Cores	Max RAM (GB)
H16r	4	64	448
H16mr	4	64	896
HC	16	704	5,632
HB	16	960	3,840
HBv2	8	960	3,840
NV6	1	6	56
NV12sv 3	1	12	112

Azure H-Series V-Series and Ansys Cloud

New VM Integrated into Ansys Cloud release

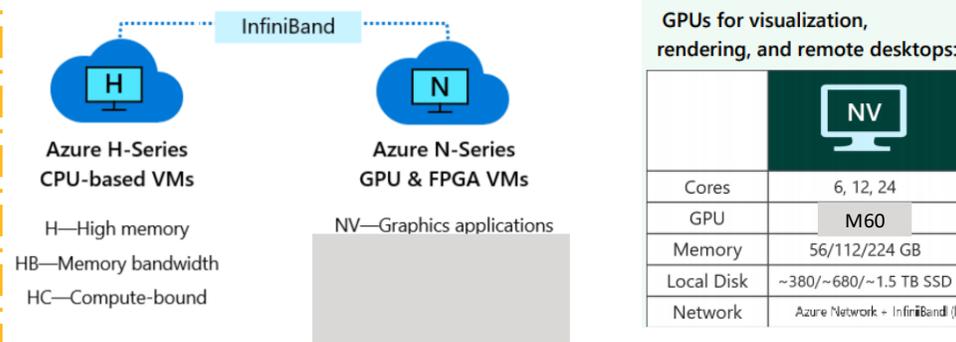
Reconfigured HPC clusters adding **HC, HB and HBv2** instances delivering larger configurations and **better price/performance**

- Updated benchmark data and **New HW recommendations**
- **Increased flexibility** for Solvers (*choose your region, VM type, number of nodes, number of cores*)
- AEDT adopting **new configurations** based on HC



Azure H-Series VM Specifications

	HBv2	HB	HC	H
Workload Optimized	Memory Bandwidth	Memory Bandwidth	Dense Compute	Large-Memory HPC
CPU	AMD EPYC 2 nd Gen "Rome"	AMD EPYC 1 st Gen "Naples"	Intel Xeon Platinum 1 st Gen "Skylake"	Intel Xeon E5 v3 "Haswell"
Cores/VM	120	60	44	16
TeraFLOPS/VM (FP64)	4 TF	0.9 TF	2.6 TF	0.7 TF
Memory Bandwidth	353 GB/s	263 GB/sec	191 GB/sec	82 GB/s
Memory	4 GB/core, 480 total	4 GB/core, 240 total	8 GB/core, 352 GB	14 GB/core, 224 GB
Local Disk	900 GB NVMe	700 GB NVMe		2 TB SATA
InfiniBand	200 Gb HDR	100 Gb EDR		56 Gb FDR
Network	32 GbE	32 GbE		16 GbE



SPEOS Packaging and Hourly Rates



Ansys Elastic Currency (5000) = 5000 AECs



Ansys Hardware Currency (5000) = 5000 AHCs



Product Category	Hourly Rates	Currency
Software Consumption Rates		
SPEOS Enterprise (incl. Solver)	20	AEC
SPEOS Solver	20	AEC
Optimization	5	AEC
SPEOS Addon (HDA, FIE, OPD, OST)	2.5	AEC
HPC Consumption Rates		
HPC (n cores)	$\text{int}(5 * n^{0.57})$	AEC

Node Type	Cores per Node	RAM per Node (GB)	GPU	Node Hourly Rate	Tasks	Currency
Ansys Cloud Hardware Consumption Rates						
HC	44	352	-	7.14	HPC Solve	AHC AEC
HBv2	120	480	-	8.12	HPC Solve	AHC AEC
NV6	6	56	M60	2.36	Cloud Desktop	AHC AEC
NV12sv3	12	112	M60	2.80	Cloud Desktop	AHC AEC

Ansys Cloud Essentials Subscription required to access Ansys Cloud

Example Configuration	HPC increments available	Software Costs	+	HPC Costs	+	Hardware Costs	=	Total Costs
Enterprise Solver on HC (44 cores)	None	20 AECs/hr (4 included cores)		40 AECs/hr (44-4 = 40 cores)		7.14 AEC/hr		67.14 AEC/hr
Enterprise Solver on HC (44 cores)	1 x HPC Workgroup 32 (BYOL) (32 included cores)	Enterprise Solver (BYOL) (4 included cores)		16 AECs/hr (44-32-4 = 8 cores)		7.14 AEC/hr		23.14 AEC/hr

*The Node Hourly Rates values vary by region (see [full list](#)).

