

# TCS HPC-Accelerated AI & Analytics (A3)

Converged, end-to-end solution for training AI, ML, and deep learning models

## Model-driven product innovation

A model-driven approach creates innovative products and services while streamlining repetitive tasks. The Data Analytics process needs to be agile and in-sync with the business, and solutions must provide effective collaboration across various departments and different personnel roles.

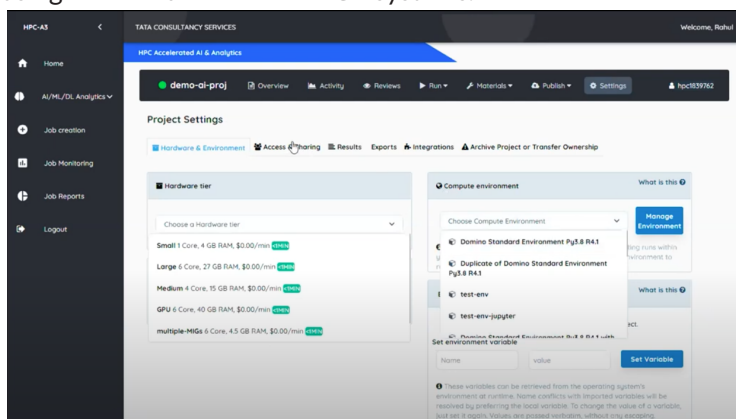
While High Performance Computing (HPC) helps process the exponentially growing volume of data, newly emerging AI/ML product development techniques require different hardware and software than traditional HPC simulation techniques.

The TCS HPC-A3 converged solution breaks down silos for industry verticals such as life sciences, manufacturing, semiconductor, where diverse workloads are a part of product and service development:

- ✓ Heterogeneous, converged hardware environment with CPUs and GPUs supports AI, analytics, and simulation workloads with optimal hardware utilization
- ✓ High-performance hardware components with in-built parallelization to enhance application performance, thus providing faster insights into data
- ✓ Single pane UX for users and admins for system and workload management enables faster adoption
- ✓ Optimized software support for AI, analytics, and simulation

## Accelerate AI Adoption

HPC A3 accelerates research, speeds up model deployment and increases collaboration among data science teams at scale. TCS's HPC-A3 solution on the [TCS Enterprise Cloud](#) is a converged end-to-end solution for training AI, ML and deep learning models using Domino and NVIDIA DGX systems.



**Figure 1:** Within the TCS HPC-A3 solution for given data science project, users can select a hardware tier from a CPU or an NVIDIA DGX A100 GPU with Multi-Instance GPU (MIG) technology and choose from different computational environments.

## Challenges to data-driven product development and innovation

- Exponential amount of data generated through digital transformation and 5G & IoT edge devices make data processing a challenge
- CPU-driven HPC has been the bedrock of design engineering and scientific simulation
- Newly emerging AI/ML techniques require different GPU hardware and technology stacks (linear algebra for HPC vs. statistical analysis libraries for AI/ML)
- Siloed environments create complex administrative challenges for maintaining data and code

## Benefits of HPC-accelerated AI

Convergence of HPC performance-driven components and inbuilt parallelism with throughput of multi-core GPUs for parallel AI & analytics workloads enables:

### Data Science Leaders gain visibility across their teams, project, and portfolio

- ✓ Gain visibility across all projects
- ✓ Decide which project to prioritize
- ✓ Deliver models faster with business impact
- ✓ Stop duplicate work

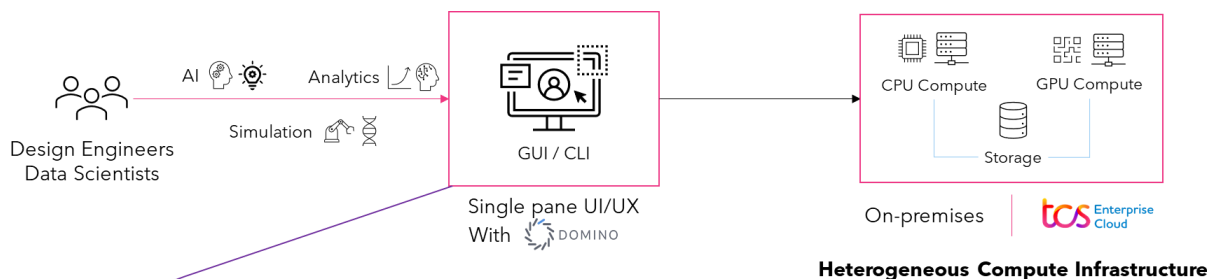
### Data Scientists can quickly build & deploy models to maximize business impact.

- ✓ Faster execution for model training and inference
- ✓ Avoid recompilation of code
- ✓ Portability between environments
- ✓ Prioritization to meet deadlines

### IT Leaders can centrally orchestrate and govern all data science workloads

- ✓ Provide data science platform at scale
- ✓ Enable systems of record of models
- ✓ Strengthen security and Governance
- ✓ Reduce DevOps and administrative costs

## Breaking Down Silos Across Simulation, Analytics, and AI



Project Workbench - Individual and collaborative workspaces	Interactive Development using tools such as JupyterLab	Data Management - Ingestion from multiple sources	Job Control - HPC and AI containerized workloads	Version Control using tools such as Git
Project Reviews - Track changes and collaborate	Model publishing using REST APIs	Project organization using tags	Metering and Billing	Environment Monitoring

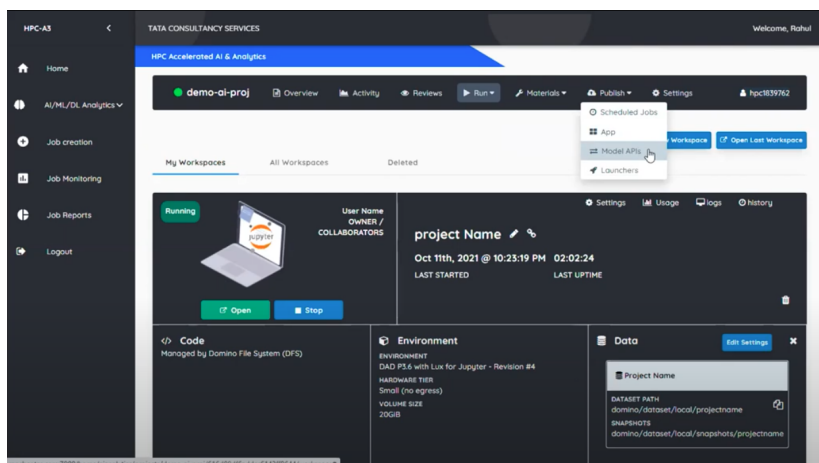
### A single-pane UI/UX across data science projects

Using HPC-3, design engineers and data scientists can leverage output data from CPU-accelerated containerized simulation workloads to train NVIDIA GPU-accelerated ML models, or vice versa, without having to move data across two traditionally siloed environments. With a single pane-of-glass, data science leaders can use this solution to track project status across teams, while IT can track infrastructure utilization for capacity planning.

### HPC-accelerated AI use cases

**Product Development:** Reduced time-to-market for innovation of existing products based on market feedback and product data. A convergent, collaborative platform enables end-to-end, secure collaboration with teams and partners across supply chain, design, engineering, manufacturing, and downstream teams.

**Digital Twin After-Sale Service:** Simulated models derived from sensor-based data from physical products can use AI/ML to simulate and visualize product defects or predict real-world maintenance requirements - in one converged environment.



**Figure 2:** HPC A3 represents an end-to-end solution for data scientists. From a single view, data scientists can get a full overview of the data science project environment, including datasets, and code, including source files and corresponding data. Models can be published, and APIs from solutions developed can be surfaced, saving significant re-work.

### Learn More

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