OAKWOOD

Powering Transformation. *Together.*

HPC ON AZURE

Azure, Microsoft's cloud computing platform, offers a comprehensive suite of services tailored for high-performance computing (HPC) applications. These services empower businesses, researchers, and developers to run compute-intensive workloads on-demand, without the overhead of managing physical infrastructure.

With Azure's HPC services, enterprises can harness the power of high-performance computing in a flexible, scalable, and secure environment. Whether it's for research, simulations, data analysis, or any other compute-intensive task, Azure has the right tools and infrastructure to drive innovation and results.

OBJECTIVE

The Azure HPC Team at Oakwood Systems Group is more than just an HPC service provider; we are your strategic partner in computational excellence, committed to ensuring that you leverage the unparalleled capabilities of Azure HPC to propel your business into the future.

We'd like to invite you to learn more about our HPC practice here at Oakwood so you can better understand why so many turn to us for their most complex HPC initiatives.

CONTENTS

ABOUT

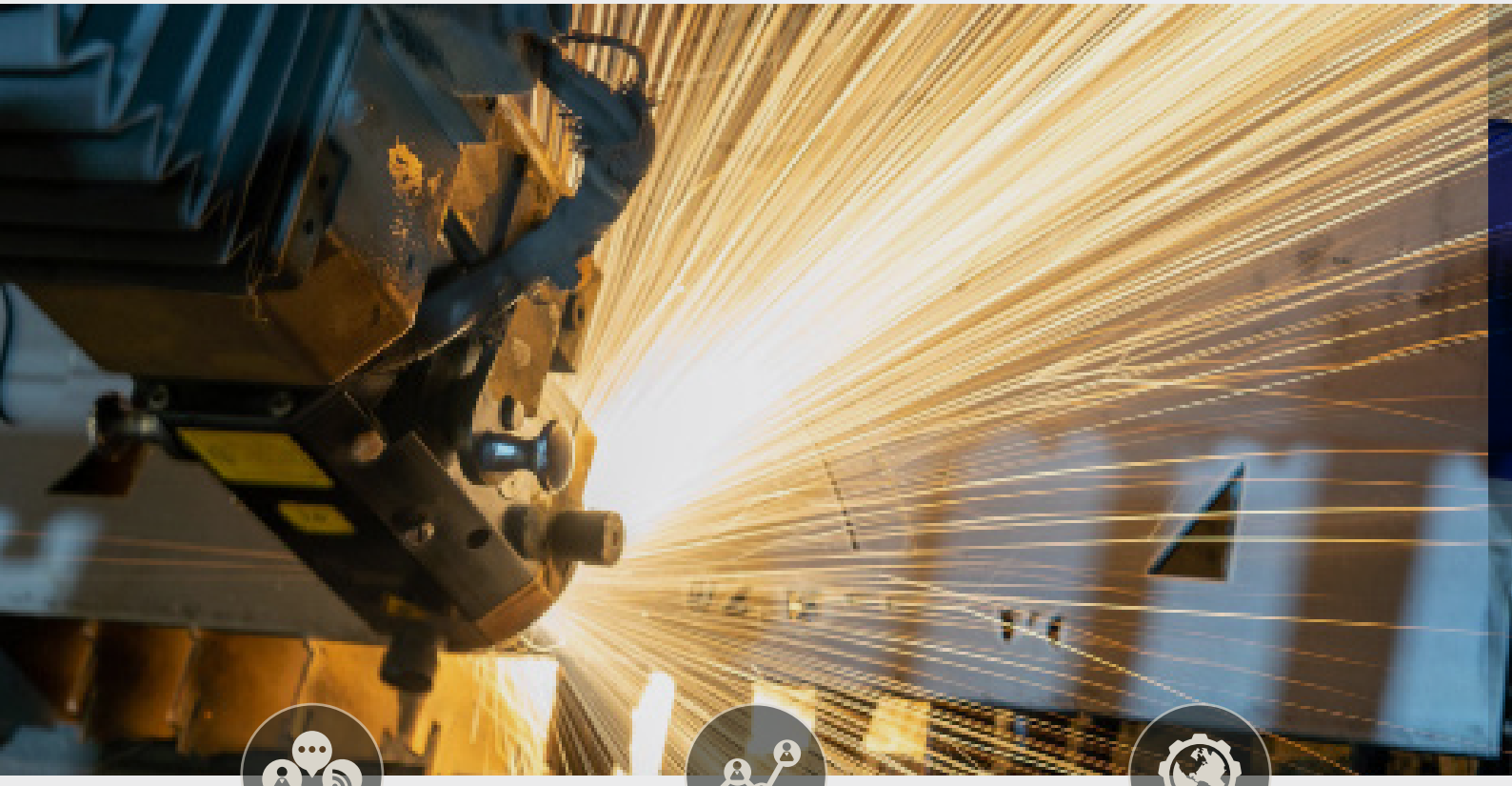
Oakwood Systems Group, Inc. stands at the forefront of High-Performance Computing (HPC) on Azure, committed to powering transformative computational solutions that drive the next wave of innovation. Over the years, our deep-rooted expertise in Azure's infrastructure has positioned us as the go-to authority for businesses seeking to harness the full spectrum of HPC capabilities available on the Azure platform.

Our seasoned team of professionals brings together a unique blend of technical prowess, industry insights, and a genuine passion for pushing the boundaries of what's possible with Azure HPC. This allows us to craft solutions tailored to the specific needs of each enterprise, ensuring optimized performance, scalability, and cost efficiency.

Beyond mere implementation, we pride ourselves on offering a holistic HPC approach. From meticulous planning and strategy development to seamless deployment, and from rigorous optimization to continuous post-implementation support, our end-to-end services ensure that our clients' HPC endeavors are always aligned with industry best practices and poised for success.

AZURE HPC FOR MANUFACTURING

DRIVING MEANINGFUL TRANSFORMATION IN THE WAY PRODUCTS ARE DESIGNED, PRODUCED, AND BROUGHT TO MARKET.



Accelerate Product Development

With Azure HPC, manufacturers can run complex simulations and models at unprecedented speeds. This means quicker design iterations, accelerated time-to-market, and reduced physical prototyping costs.

Enhanced Product Quality

By utilizing Azure's powerful computing capabilities, manufacturers can carry out more detailed and accurate simulations, leading to better product designs, fewer defects, and a reduced need for costly recalls.

Data-Driven Decision Making

Azure HPC, combined with Azure's analytics and AI tools, empowers manufacturers with real-time insights from their data, be it from simulations, IoT devices on the production floor, or the supply chain.

AZURE HPC FOR LIFE SCIENCES

DIRECTLY ADDRESSING THE INDUSTRY'S INTRICATE COMPUTATIONAL DEMANDS AND FOSTERING INNOVATIVE RESEARCH.

Accelerated Research & Discovery

Azure HPC facilitates the swift processing of large-scale genomic sequencing, molecular simulations, and drug discovery tasks. This speed empowers researchers to make quicker breakthroughs and innovations.

Scalability & Flexibility

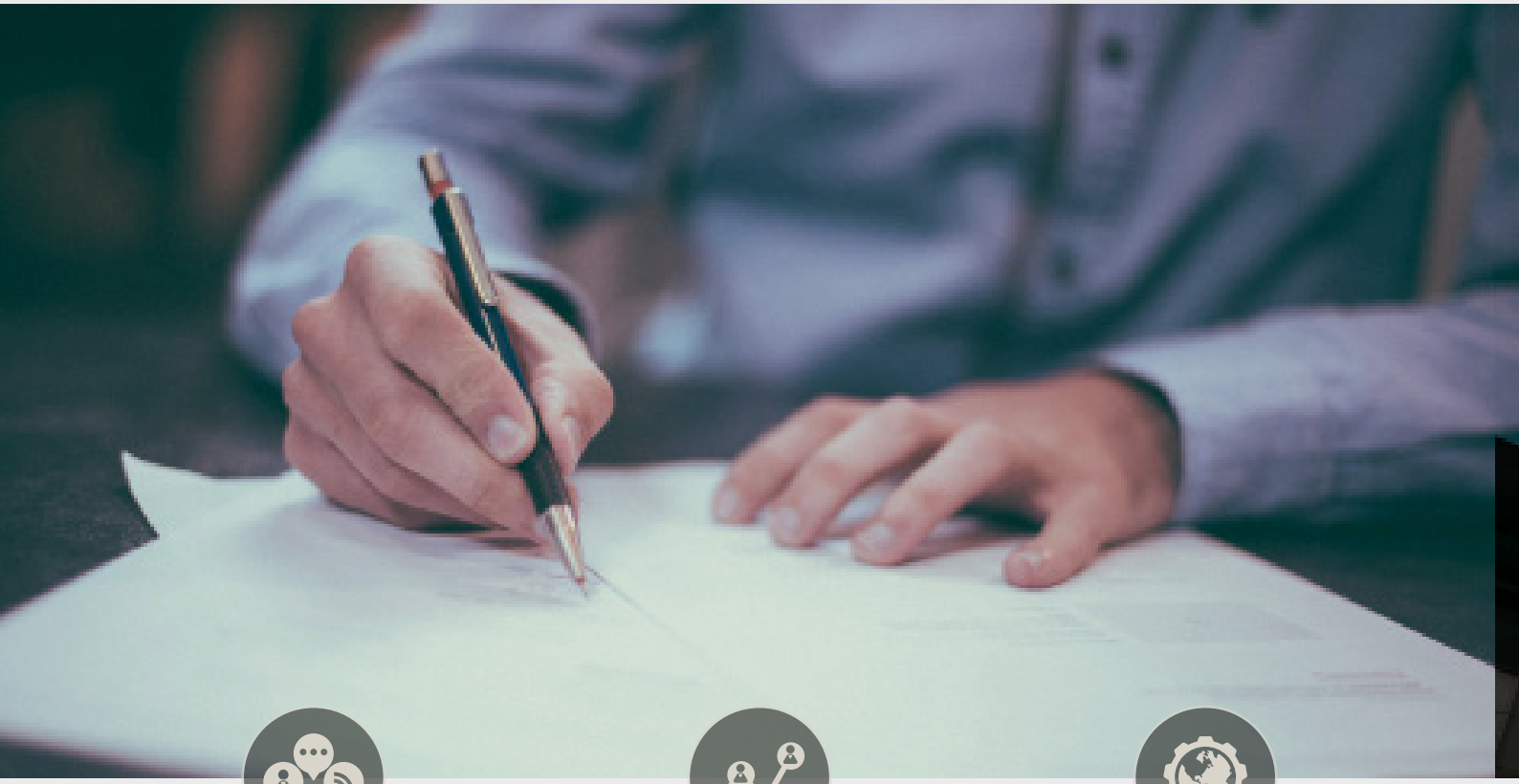
Life sciences workloads, from genomic sequencing to protein folding simulations, vary in complexity. Azure HPC offers scalable resources, allowing institutions to adjust computational power based on the project's demands.

Data Security & Compliance

Protecting sensitive patient data is paramount. Azure ensures that data remains encrypted both in transit and at rest, and offers tools to help institutions remain compliant with regulations like HIPAA and GDPR.

AZURE HPC FOR INSURANCE

RESHAPING THE WAY INSURERS ASSESS RISK, ENGAGE WITH CUSTOMERS, AND INNOVATE.



Enhanced Risk Modeling

Azure HPC facilitates rapid processing of complex risk simulations and models. For sectors like catastrophe insurance, where understanding natural disaster probabilities is crucial, HPC allows for more detailed and frequent scenario analyses.

Real-Time Data Processing

With the surge in IoT devices, like those in connected cars or smart homes, insurers can analyze real-time data streams to assess and adjust policies, prices, and payouts, ensuring more accurate and timely decision-making.

Fraud Detection & Prevention

Using Azure's HPC in conjunction with machine learning and AI tools, insurers can sift through massive datasets to identify patterns and anomalies, enabling early detection and mitigation of fraudulent claims.

AZURE HPC FOR FINANCIAL SERVICES

ENABLING FIRMS TO REMAIN AGILE, COMPLIANT, AND AHEAD OF THE CURVE IN A RAPIDLY EVOLVING FINANCIAL LANDSCAPE.

Accelerated Quantitative Analysis

Azure HPC allows financial firms to execute complex quantitative models and simulations at unparalleled speeds, crucial for tasks like option pricing, risk management, and portfolio optimization.

Advanced Risk Modeling

With HPC, banks and financial institutions can run intricate risk simulations faster, enabling a more granular understanding of potential market shocks and credit exposures.

Regulatory Compliance

Financial services operate under strict regulations. Azure offers tools to ensure data handling, storage, and processing align with industry regulations like Dodd-Frank, MiFID II, or Basel III.

AZURE HPC FOR GENOMICS

OVERCOMING THE UNIQUE CHALLENGES PRESENTED BY THE SHEER VOLUME AND COMPLEXITY OF GENOMIC DATA.

Rapid Genome Sequencing

With Azure HPC, genomics labs can process and analyze vast amounts of DNA and RNA sequence data much more swiftly, reducing the time from sample to insight and accelerating diagnostics and therapeutic discovery.

Secure Genomic Data Handling

Azure places paramount importance on data security. With strong encryption measures and state-of-the-art security protocols, sensitive genomic data remains protected against breaches and unauthorized access.

Facilitated Data Sharing

Azure streamlines the process of sharing genomic data with relevant stakeholders, be it researchers, clinicians, or patients, ensuring swift and secure access to critical insights.

AZURE HPC FOR AUTOMOTIVE

CATERING TO THE GROWING COMPUTATIONAL DEMANDS ARISING FROM THE MOVE TOWARDS ELECTRIFICATION, AUTONOMY, AND PERSONALIZED CUSTOMER EXPERIENCES.

Advanced Simulations & Modeling

Azure HPC provides the computational firepower required for the detailed simulations of crash tests, aerodynamics, and thermal dynamics, allowing for safer, more efficient vehicle designs without the extensive physical trials.

Autonomous Vehicle Development

HPC capabilities are essential for processing the vast amounts of data generated during autonomous vehicle testing, as well as for training the machine learning models that drive these vehicles.

Connected Car Infrastructure

Azure HPC, combined with Azure's IoT solutions, can process and analyze data from connected vehicles in real-time, leading to improved safety features, predictive maintenance, and personalized driver experiences.

Application Development & Modernization Services for HPC

By leveraging Azure-specific services such as Azure Kubernetes Service (AKS) for containerization, Azure Batch for scalable batch processing, and Azure Monitor for in-depth performance insights, the Oakwood Team will ensure that your HPC applications are both state-of-the-art and future-proof.

Microsoft Solutions Partner
Data & AI
Azure

Microsoft Solutions Partner
Digital & App Innovation
Azure

Microsoft Solutions Partner
Infrastructure
Azure

01

Cloud-Native Application Development

Recognizing the transformative power of the cloud, we specialize in designing and constructing HPC applications that are intrinsically built for cloud environments, particularly harnessing the robust infrastructure and tools offered by Azure. Our approach prioritizes scalability, flexibility, and performance. We exploit the inherent parallelism provided by cloud platforms, allowing applications to run multiple tasks concurrently, resulting in drastic reductions in computational times. Additionally, we leverage the capabilities of GPU-Accelerated Computing, tapping into the raw computational power of GPUs for tasks that demand intense resources. Every application we develop is engineered with the cloud in mind, ensuring seamless integration with other cloud services, optimal resource utilization, and cost-effective scaling.

02

Parallel Programming

Parallel programming stands as a cornerstone of our application development services, particularly in the realm of High-Performance Computing (HPC). Understanding the importance of efficient and faster computations in today's data-driven world, we have honed our expertise in crafting applications that distribute tasks across multiple processors simultaneously. By embracing the principles of parallelism, we ensure that complex computations are broken down and executed concurrently, drastically slashing processing times and enhancing application throughput. Our adept team delves deep into both task-based and data-based parallelism, ensuring that every aspect of a given problem is addressed in the most optimized manner.

03

Application Optimization

Our approach to application optimization is holistic, starting from the ground up, analyzing code structures, algorithms, and data flows. We identify bottlenecks, areas of latency, and potential inefficiencies, then meticulously rework them to achieve faster processing times and improved responsiveness. Our team leverages state-of-the-art tools and methodologies to profile and benchmark applications, ensuring that each optimization effort is data-driven and results-oriented. Beyond code and algorithm refinement, we also delve into infrastructure and platform-specific optimizations, ensuring that applications make the most of the underlying hardware and cloud capabilities.

Infrastructure Services for HPC

Using Azure-specific tools and services, Oakwood advises on best practices for configuring virtual networks, setting up high-speed interconnects using Azure ExpressRoute, and deploying compute resources like Azure VMs optimized for HPC tasks.

Microsoft Solutions Partner
Data & AI
Azure

Microsoft Solutions Partner
Digital & App Innovation
Azure

Microsoft Solutions Partner
Infrastructure
Azure

01

Cluster Management

By leveraging tools like Azure CycleCloud and Azure Batch, Oakwood enables organizations to dynamically provision, manage, and scale clusters to meet fluctuating computational demands. Our expertise would extend beyond mere deployment to encompass optimal configuration, ensuring clusters are fine-tuned to deliver peak performance for specific HPC workloads. With security being paramount, the Oakwood Team also provides robust measures to safeguard clusters, leveraging Azure's advanced security tools and best practices. We also utilize Azure Monitor and Log Analytics to provide real-time insights into cluster health, performance, and to uncover potential bottlenecks.

02

Cloud Infrastructure

Oakwood's HPC Team will take ownership of the strategic design and deployment of Azure's vast infrastructure offerings. Whether our clients seek virtualized compute resources with Azure VMs, scalable storage solutions via Azure Blob Storage, or low-latency networking through Azure ExpressRoute, Oakwood is primed to deliver. Recognizing the importance of a seamless and resilient architecture, we'll advise on best practices for multi-region deployments, redundancy, and disaster recovery, leveraging tools like Azure Site Recovery. Using Azure Monitor and Azure Cost Management, we help organizations achieve peak operational efficiency while maintaining cost-effectiveness.

03

Storage Solutions

Recognizing that data forms the backbone of today's digital businesses, Oakwood adeptly navigates Azure's multifaceted storage landscape to architect and implement solutions that align with specific client requirements. Whether it's leveraging Azure Blob Storage for vast, unstructured data, Azure Files for shared file storage, or Azure Disk Storage for high-performance, durable disk requirements, we'll ensure optimal configuration and deployment. Given the growing emphasis on data regulations and security, we also guide organizations in implementing advanced encryption, access controls, and compliance policies using tools like Azure Security Center.

Data & Analytics Services for HPC

Oakwood designs and implements robust data pipelines that harness the power of Azure's HPC capabilities. We guide organizations in leveraging Azure Data Factory to orchestrate and automate data workflows, ensuring efficient data movement and transformation.

Microsoft Solutions Partner
Data & AI
Azure

Microsoft Solutions Partner
Digital & App Innovation
Azure

Microsoft Solutions Partner
Infrastructure
Azure

01

Data Management and Curation

Oakwood's HPC Team offers a robust suite of solutions to address the intricate challenges posed by massive computational datasets. At the forefront of our services is the design and implementation of comprehensive data governance strategies, utilizing tools such as Microsoft Purview to track data lineage, cataloging, and discoverability. This ensures that HPC-processed data is consistently accurate, usable, and readily available for analytical endeavors. Oakwood guides clients through the integration of Azure Data Lake Storage and Azure Blob Storage, optimizing storage strategies tailored for structured and unstructured HPC datasets. Recognizing the nuances of HPC data, we offer expert curation services, ensuring data is cleaned, classified, and annotated appropriately

02

Data Security

Oakwood's expertise encompasses the entire data security lifecycle, from data creation to disposal, ensuring rigorous protection at every touchpoint. Leveraging tools such as Azure Security Center, we offer real-time monitoring and threat detection, enabling proactive responses to potential security breaches. Key to our services is the meticulous implementation of encryption both at rest, using Azure Disk Encryption, and in transit with Azure's robust VPN and Azure ExpressRoute solutions. We guide organizations in setting up advanced access controls, utilizing Azure Active Directory and role-based access control (RBAC) to ensure that only authorized personnel can access sensitive HPC data. Oakwood leverages Azure Policy and Azure Blueprints to ensure adherence to industry regulations and standards.

03

Data Visualization

Oakwood excels in translating intricate computational outputs into clear, interactive visual narratives. Harnessing the power of tools like Power BI, we enable organizations to craft dynamic dashboards and reports, seamlessly integrated with Azure's diverse data sources such as Azure Data Lake Storage and Azure SQL Data Warehouse. By employing advanced visualization techniques, we simplify the interpretation of vast HPC datasets, making patterns, trends, and anomalies readily identifiable to our customer's stakeholders. Oakwood's Data Visualization services extend to capacity planning and fine-tuning, guaranteeing that the visual tools remain agile in the face of growing HPC data.

HPC ON AZURE: *BRIEFING*

OAKWOOD HPC ENGAGEMENT

DELIVERABLES

- Briefing Document & Executive Summary
- Presentation Slides
- Cost Analysis
- Technical Architecture Diagrams
- Security & Compliance Checklist
- Client-Specific Recommendations
- Implementation Best Practices Guide
- Support & Training Materials
- Follow-up Meeting Schedule & Agenda

Oakwood's HPC on Azure Briefing engagement is designed to streamline the adoption and optimization of Azure HPC solutions. Tailored to each organization's unique needs, this briefing provides a roadmap that aligns with specific operational goals and challenges, making the implementation of HPC a strategic fit. Moreover, it aids in efficient resource utilization, ensuring that companies can achieve top-tier performance and scalability without superfluous costs.

WHAT TO EXPECT:

- Introduction to Azure HPC: Definition & Benefits
- HPC Infrastructure Components: VMs, Azure Batch, CycleCloud, and Blob Storage
- Networking: VNet, ExpressRoute, and Accelerated Networking
- Data & Storage Solutions: NetApp Files, Managed Lustre + HSM
- Integration: Azure compatibility with HPC software
- Security & Compliance: IAM, Azure Security Center, and Azure Compliance Standards
- Cost Management: Azure Cost Management & Billing
- Next Steps & Recommendations

HPC ON AZURE: *MIGRATION ASSESSMENT*

OAKWOOD HPC ENGAGEMENT

DELIVERABLES

- Assessment Report: Detailing current state analysis, compatibility checks, cost benefit analysis, and recommendations
- Presentation: A slide deck summarizing the assessment's key findings, suitable for stakeholder meetings or executive reviews
- Roadmap: A visual representation or timeline suggesting a path from the current state to a potential Azure HPC Implementation

Oakwood's HPC on Azure Assessment engagement provides a thorough evaluation of an organization's current computational infrastructure, workflows, and objectives. With deep insights garnered from the evaluation, Oakwood's HPC Team can then tailor Azure HPC solutions to meet specific operational needs, ensuring optimized performance, scalability, and cost efficiency. Such a targeted approach eliminates the trial and error that can plague cloud transitions, translating into significant time and cost savings.

This assessment is more than just a technical evaluation; it serves as the foundation of a strategic partnership that paves the way for technological excellence, operational agility, and sustained business growth.

WHAT TO EXPECT:

- Azure HPC Compatibility Check
- Cost Benefit Analysis: Tentative Cost Estimates
- Security & Compliance Overview: Discuss Azure Security and Compliance Certifications
- Preliminary Migration Strategy: High-Level Roadmap to Transitioning to Azure
- Next Steps & Recommendation

HPC ON AZURE:
PROOF OF CONCEPT (POC)

OAKWOOD HPC ENGAGEMENT

DELIVERABLES

Report

- Objective & Scope of The PoC
- Configuration Details
- Results & Analysis
- Comparisons (if applicable)
- Recommendations for potential full-scale deployment

Demo Session

- Live Demo Showcasing PoC in Action

Oakwood's HPC on Azure 4-Week Proof of Concept (PoC) offers a compelling opportunity for organizations to experience firsthand the transformative potential of Azure's high-performance computing capabilities. Embarking on a PoC acts as a tangible testbed, allowing organizations to visualize and understand how Azure HPC would integrate with and elevate their specific workflows without committing to a full-scale implementation. This hands-on exploration, guided by the nuanced expertise of Oakwood, ensures that the solution is tailored to the organization's unique challenges and objectives.

This PoC dramatically reduces the risk associated with cloud transitions. By creating a controlled environment where Azure HPC solutions can be tested, refined, and validated, organizations can confidently move forward, knowing that the proposed solutions align with their requirements.

WHAT TO EXPECT:

- **Scope**: We'll work together to choose a representative workload or application, meaningful to the client, to showcase Azure's HPC capabilities. Here we will identify VMs, storage, and/or other Azure resources to control costs and complexity.
- **Setup**: Our Team will deploy a subset of Azure HPC components relevant to the PoC and use sample datasets, preferably provided by the client, to make the PoC results more relevant.
- **Execution**: We'll assist the client in migration and execution of one of their workloads in the HPC environment. Our Team will monitor and analyze performance metrics, resource utilization, etc.
- **Comparison**: Assist client in providing a comparison of the same workload or application running in the client's on-premises environment. Highlight improvements, scalability, and cost-efficiencies.

HPC ON AZURE: *8-WEEK IMPLEMENTATION*

OAKWOOD HPC ENGAGEMENT

DELIVERABLES

- Architecture diagrams and solution design documents.
- Detailed documentation on the system setup, configurations, and best practices.
- A fully functional Azure HPC environment tailored to the client's needs.
- Training materials and session recordings (if conducted virtually).
- Post-implementation support plan.

Oakwood's HPC on Azure 8-Week Implementation is a focused engagement designed to deliver rapid results, ensuring that businesses can quickly leverage the immense power of Azure's high-performance computing for their specific needs. With the deep expertise of Oakwood's HPC Team at the helm, organizations can navigate the intricacies of Azure HPC with precision, ensuring a smooth transition and optimized setup.

By streamlining the implementation process, organizations can begin to realize the benefits of Azure HPC – from faster data processing to complex simulations – in a fraction of the time it might typically take. This swift turnaround is invaluable in today's fast-paced market landscape, where agility and the ability to quickly adapt are paramount.

WHAT TO EXPECT:

- **Kick-Off & Assessment**: Here we'll aim to understand and finalize goals of the initiative and evaluate client's current infrastructure, applications, data sources, and network. Stakeholder meetings will be determined.
- **Solution Design**: Architecture design, networking and storage planning, and resource allocation will take place as we draft the HPC solution.
- **Infrastructure Setup**: We'll configure various HPC components (VMs, CycleCloud, etc.) and configure network and storage.
- **Data Migration & Application Configuration**: Migration of datasets to Azure, install and configure client's applications and conduct performance tuning.
- **Pilot Testing**: We'll assist the client in conducting initial runs of a workload to test while monitoring the results to gather feedback.
- **Optimization & Scaling**: Make any necessary adjustments and implement auto-scaling (if needed).
- **Training & Documentation**: Conduct training sessions to acquaint client to new HPC setup.

HPC ON AZURE: *MANAGED SERVICE*

OAKWOOD HPC ENGAGEMENT

DELIVERABLES

- Monthly/Quarterly performance and cost reports.
- Security audit results and vulerability assessment reports.
- Regular system backups and disaster recovery tests.
- Updated documentation and training materials.

Oakwood's HPC on Azure Managed Service provides organizations with a sustained partnership that ensures continuous optimization, reliability, and efficiency in their high-performance computing endeavors. In today's dynamic technological landscape, merely implementing a solution isn't enough; the real value lies in its ongoing management, enhancement, and adaptation to ever-evolving business needs. With the dedicated oversight of Oakwood HPC SMEs, organizations are assured that their Azure HPC infrastructure operates at peak performance and is consistently aligned with industry best practices.

WHAT TO EXPECT:

- Continuous Monitoring & Reporting
- Performance Optimization Opportunities
- Scalability Management
- Cost Management
- Security & Compliance Configuration and Monitoring
- Training & Support
- Quarterly Stakeholder Reviews & Strategy Discussions

OAKWOOD

Powering Transformation. Together.

www.oakwoodsys.com

sales@oakwoodsys.com

St. Louis - Headquarters

1001 Craig Rd. Suite 305

St. Louis, MO 63146

(314) 824-3000

Kansas City Office

10000 Marshall Dr. #27

Lenexa, KS 66215

(913) 232-4057