

Fan Yang

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About Me

Computational Engineer with 6 years of experience in system architecture and HPC administration. Currently focused on accelerating hybrid HPC, quantum, and AI workflows, optimizing cross-platform communication and numerical kernel performance. Published researcher with experience designing interoperable data frameworks for multi-stakeholder environments.

Education

Ruhr Universität Bochum, Germany	Oct 2023 - Present
Master in Computational Engineering	Current GPA: 2.5
Hohai University, China	Sep 2012 – Jul 2016
Bachelor of Engineering Mechanics	GPA: 82.03/100

Work Experience

Xiamen Cardiovascular Hospital, Xiamen University	Jul 2017 – Sep 2023
Computational Engineer (System Architecture & Numerical Modeling)	Xiamen, China
<ul style="list-style-type: none">HPC Infrastructure & Orchestration: Orchestrated institutional cluster operations using SLURM; optimized job scheduling and resource allocation policy for high-concurrency numerical workloads.Numerical Solver Optimization: Configured and tuned iterative solvers for large-scale sparse matrix operations in Abaqus, enabling high-fidelity deformation analysis and failure root-cause investigation.System Architecture & Middleware: Architected a low-cost, high-efficiency middleware layer using 6 custom APIs to bridge heterogeneous departmental databases; enabled seamless data interoperability and HPC result integration without requiring proprietary software overhauls.Fault Tolerance & Reliability: Diagnosed critical synchronization failures in distributed data transfers; engineered fault-tolerant mechanisms that eliminated data loss while maintaining system low-latency.Technical Leadership: Directed a cross-functional team to unify disparate information systems; published peer-reviewed research on interoperability protocols and system framework design.	
Project Team Lead (System Governance & Large-scale Implementation) Xiamen, China	
<ul style="list-style-type: none">Technical Leadership & Budgetary Allocation: Led a cross-functional team of 10+ engineers to develop and maintain a mission-critical medical device tracking system; managed complex financial workflows for 40+ upstream suppliers and large-scale patient insurance claims.System Optimization: Engineered significant updates to the institutional resource planning (ERP) environment to accommodate shifting procurement logic, optimizing data consistency during large-scale policy transitionsPredictive Supply Chain Management: Developed and integrated a statistical prediction algorithm for medical device consumption; utilized historical usage patterns to dynamically optimize procurement volumes and reduce inventory overhead.Information Governance & Decision Support: Served as Secretary of the Medical Device Information Management Committee; authored data governance frameworks and synthesized institutional data to provide the super-administration with critical metrics for strategic decision-making.Regulatory Compliance: Engineered system-level policies to ensure data handling remained compliant with national healthcare regulations and security standards across all clinical departments.	

Xiamen International Bank, Corp. LTD	Jul 2016 – Jun 2017
Management Trainee – Quantitative Risk Analysis	Xiamen, China
<ul style="list-style-type: none">Quantitative Risk Modeling: Completed intensive training in statistical risk modeling and financial data analysis, gaining practical experience in large-scale financial operations and structured decision-making, including the validation of a 10-million RMB high-value transaction.Data Processing & Statistical Analysis: Managed high-volume banking datasets by implementing complex lookup operations and data-joining techniques; performed statistical profiling on transaction metadata to develop risk-based loan eligibility models.	

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Project Experience

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| MPI-based Parallelization and Optimization of a Molecular Dynamics Solver | April 2025 – Jul 2025 |
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- Developed a high-performance **Molecular Dynamics (MD) solver** from first principles in C++, employing a **Velocity-Verlet** integration scheme to ensure symplectic, energy-conserving time evolution for large-scale N-body simulations.
 - Architected a **3D Domain Decomposition** framework using **MPI** for distributed-memory parallelism, incorporating **ghost-cell exchange** and dynamic load-balancing to optimize data locality and throughput.
 - Enhanced computational efficiency by implementing **Cell Lists** and **Verlet Neighbor Lists**, successfully reducing the algorithmic complexity of Lennard-Jones force calculations from $O(N^2)$ to $O(N)$.
 - Conducted rigorous **HPC benchmarking** to evaluate strong and weak scaling on multi-node architectures; performed bottleneck analysis to maximize **arithmetic intensity** and minimize MPI synchronization latencies.
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| Develop Quantum-Classical Hybrid Computing Package | Oct 2025 – Dec 2025 |
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- Developed a **Quantum-Classical Hybrid** benchmark suite in C++, implementing both **HHL** and **VQLS** algorithms to evaluate hardware-efficient solutions for large-scale linear systems ($Ax = b$).
 - Orchestrated complex hybrid workflows using the **XACC Framework**, enabling seamless hardware-agnostic integration across diverse quantum backends and simulators.
 - Conducted low-level performance profiling of **Intermediate Representation (IR) transformations** and compiler optimizations, providing insights into the overhead of hybrid execution compared to pure classical solvers.
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| Digital twins in surrogate model | Oct 2025 – Jan 2026 |
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- Engineered a **Digital Twin prototype** bridging high-fidelity FEM simulations with **ML-based surrogate models** (PyTorch) to achieve real-time predictive capabilities.
 - Optimized the data-generation pipeline by leveraging HPC resources to produce and preprocess massive datasets, reducing surrogate training latency while maintaining physical accuracy.
 - Integrated the surrogate model with a **Unity-based visualization engine** for interactive exploration, demonstrating the feasibility of real-time "Human-in-the-Loop" simulation for complex system behavior.
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| Develop an Advanced Nonlinear FEM Solver in Java | Aug 2025 – Sep 2025 |
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- Architected a **modular, Object-Oriented FEM engine** in Java, utilizing polymorphism to decouple numerical kernels from material models and visualization logic.
 - Implemented **Newton-Raphson** and **Arc-Length** iterative solvers to handle high-dimensional nonlinear systems, focusing on algorithmic stability and memory-efficient sparse matrix operations.

Technical Skills

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- **Languages:** C++, Java, Python, SQL; *Familiar with:* C, R, MATLAB.
 - **Parallel Computing & HPC:** MPI, OpenMP, SLURM, Docker.
 - **Quantum & Hybrid Systems:** XACC (Hybrid Workflows), Qiskit, Quantum Intermediate Representation (QIR).
 - **AI & Surrogate Modeling:** PyTorch (CNNs, Transformers), Scikit-learn, Neural Network-based Surrogate Models for Physical Systems, NumPy/Pandas.
 - **Systems & Cloud:** Linux, Microsoft Azure (HPC Instances), GitHub, Jupyter.

Awards

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| • Best Employee of the Year, Xiamen Cardiovascular Hospital, Xiamen University | Dec 2022 |
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| • Star of Innovation, Xiamen Cardiovascular Hospital, Xiamen University | Dec 2020 |
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| • Junior Banker Merit Recognition, Xiamen International Bank, Corp. LTD | March 2017 |
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| • Academic Progress Award and Scholarship, Hohai University | Nov 2014 |
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Publications

Fu, L., Yang, F., & Shi, Y. (2023). *Exploration and practice of a UDI-based management model*. China Medical Device Information.

Contribution: Led the conceptual design and architecture of a middleware framework integrating six heterogeneous hospital information systems; engineered custom APIs to enable cross-department interoperability while ensuring data integrity under resource-constrained conditions.