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 Univeristy, 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

- **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

- **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 transitions

- **Predictive 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

- **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.

Project Experience 🖥

MPI-based Parallelization and Optimization of a Molecular Dynamics Solver April 2025 – Jul 2025

- 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.

Develop Quantum-Classical Hybrid Computing Package Oct 2025 – Dec 2025

- 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.

Digital twins in surrogate model Oct 2025 – Jan 2026

- 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.

Develop an Advanced Nonlinear FEM Solver in Java Aug 2025 – Sep 2025

- 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 💻

- **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 🏆& Honors

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

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.