

Marcellinus Aroli

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PROFILE SUMMARY

High-performance C++ Software Engineer with 6+ years of experience delivering in-silico cardiac electrophysiology simulators at MetaHeart (Computational Medicine Laboratory). Specializes in accelerating large-scale numerical simulations using MPI and CUDA on Linux, consistently improving runtime and reliability in research-grade software.

EDUCATION

PhD of Engineering expected August 2026
Kumoh Institute of Technology

Master of Engineering August 2018
Kumoh Institute of Technology

B. Sc. Information Technology September 2015
President University

RELEVANT COURSEWORK

Computational Physiology | Algorithm and Data Structure | Differential Equation | Applied Mathematics | Software Engineering

PROFESSIONAL EXPERIENCE

Computational Medicine Laboratory (MetaHeart) – Software Engineer & Team Manager Sep 2018 – Present

- Designing and developing CardioSim, a C++-based cardiac electrophysiology simulation platform used by students and researchers for modeling and analysis.
- Implementing parallel programming with MPI and CUDA in performance-critical simulation kernels, improving overall runtime by approximately 30%.
- Building and maintaining a Qt Widgets-based GUI for CardioSim, enabling intuitive setup, execution, and visualization of complex simulation experiments.
- Collaborating with researchers to translate mathematical and physiological models into robust C++ components.
- Managing the development team that consists of 3 members and tracking their development progress with their respective works.

PT iForce Indonesia – Software Engineer (as vendor for Maybank Indonesia) Dec 2015 – Aug 2016

- Improved and extended Maybank's Online Customer Registration System, delivering new features to streamline onboarding and automate document handling.
- Built and integrated scanned-document processing modules using the OpenText API, enabling accurate extraction of 15+ data fields per document and reducing manual data entry by ~40%.
- Refactored key backend components to improve performance, reducing average document-processing time from ~12 seconds to ~7 seconds ($\approx 40\%$ faster).
- Collaborated closely with business analysts and technical teams to translate requirements into scalable, maintainable solutions aligned with banking compliance standards.
- Optimized processing workflows by refactoring legacy components, resulting in more reliable performance and reduced processing errors.

Aprisma Indonesia – IT Support (as vendor for ANZ Indonesia)

Jan 2012 – Jan 2014

- Resolved technical issues for 500+ internet banking users per month, helping maintain 99.9% system uptime and high customer satisfaction.
- Designed and implemented middleware integrations enabling credit card point redemption in online marketplaces within the Internet Banking platform.
- Coordinated deployment of 10+ major system updates, ensuring minimal downtime and adherence to banking security and compliance standards.
- Collaborated with cross-functional teams to analyze customer requirements and deliver solutions that improved system performance by approximately 15%.
- Monitored and tuned internet banking application and middleware components, proactively reducing incidents by around 20% through early detection.

TECHNICAL SKILLS & CERTIFICATION

Computer-related:

C/C++ | Qt | CUDA | MPI | Linux | Java

Language:

English: TOEIC 990, IELTS 6.0

Korean: KIIP 1 (as equal as TOPIK 1)

PROJECT EXPERIENCE

MetaHeart – CardioSim Electrophysiology Simulator (<http://cardiosim.metaheart.kr:8080/>)

- Developed a high-performance cardiac electrophysiology simulator with an emphasis on numerical accuracy and computational efficiency.
- Implemented core simulation algorithms in classic C++, ensuring robust memory management (with pointers and references), deterministic execution, and minimal overhead.
- Optimized nonlinear ODE/PDE numerical solvers for simulating cardiac action potentials, reducing simulation time by up to 30% with the correct parameters.
- Designed and built the GUI using Qt, enabling intuitive visualization and interaction with complex electrophysiology models.
- Refactored legacy components into modular, testable C++ classes, improving maintainability and overall code quality.
- Implemented multi-threaded workloads using MPICH and CUDA GPU to accelerate simulation loops on multi-core architectures.
- Ensured numerical correctness through unit testing, validation against published electrophysiology models, and reproducibility checks.
- Integrated file I/O pipelines for simulation parameters, logs, and visualization outputs (JSON/CSV/binary formats).
- Collaborated in the design of the simulator architecture, ensuring scalable code structure suitable for future extensions (e.g., tissue-level modeling).

HONORS & AWARDS

KOSOMBE Best Poster Presentation Award

May 2023

- Recognized for an exemplary presentation for my laboratory project, CardioSim.