Paul Namalomba - Computational Engineer, Software Engineer & Materials Scientist

LinkedIn GitHub Email

> Computational Engineer specializing in materials testing analysis, data engineering, and full-stack development

About Me!

I'm a passionate software engineer and computational engineer with expertise in materials analysis, data engineering, and backend development. Currently working as a **SESKA Computational Engineer** developing advanced material analysis software and **SEAT Backend Developer** building robust Django applications for educational enrollment systems.

Current Focus

- **Computational Engineering & Materials Engineering**: Developing finite element analysis tools for advanced materials testing. Computational mechanics, viscoplasticity, and composite materials
- **Machine Learning & Data Science**: Implementing clustering algorithms, outlier detection, and regression analysis for scientific data
- **Backend Development**: Building scalable Django applications with PostgreSQL databases. Building Python apps and modules for data processing and analysis
- **Data Engineering**: Creating robust pipelines for scientific data processing and analysis, ensuring data integrity and performance. Database design, management, and optimization

Professional Experience

SESKA Computational Engineer

Current Position

- Develop advanced material analysis software in **C++** and **Fortran** for engineering applications
- Create algorithms for LVDT (Linear Variable Differential Transformer) sensor data processing
- Implement sophisticated data filtering and segmentation techniques using high-performance computing libraries
- **Unique Windows Port**: Successfully ported SESKA software to Windows using **MinGW64** - a challenging and fairly unique implementation leveraging PETSc on Windows
- **CI/CD Management**: Handle all continuous integration and deployment pipelines on **Bitbucket**
- Build visualization pipelines for materials testing analysis

Key Technologies: C++, Fortran, PETSc, OpenMPI, OpenBLAS, ScaLAPACK, MUMPS, METIS, MinGW64, Bitbucket CI/CD

SEAT Backend Developer

Current Position

- Develop and maintain Django-based enrollment management system
- Design and implement PostgreSQL database schemas
- Build REST APIs for student enrollment and data management
- Ensure data integrity and system scalability

Key Technologies: Python, Django, PostgreSQL, REST APIs, Git

Technical Skills

System Architecture and Operating Systems

MinGW64 MSYS2 Ubuntu WSL Windows

Programming Languages

Python C++ Fortran PowerShell SQL JavaScript

Frameworks & Libraries

Django NumPy Pandas Scikit-learn PETSc OpenMPI

HPC & Scientific Computing

OpenBLAS ScaLAPACK MUMPS METIS

Databases & Tools

PostgreSQL Git VS Code

Specializations

- **High-Performance Computing**: C++/Fortran development with PETSc, OpenMPI, parallel computing
- **Cross-Platform Development**: Unique Windows porting expertise using MinGW64 for scientific software
- **CI/CD Engineering**: Bitbucket pipeline management and deployment automation
- **Data Science & Machine Learning**: Statistical analysis, clustering algorithms, outlier detection
- **Scientific Computing**: Materials testing analysis, LOWESS smoothing, gradient analysis
- **System Administration**: Windows, Linux, automation scripting
- **Data Engineering**: ETL pipelines, data validation, processing optimization

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Featured Projects

SESKA Finite Element Analysis Tool

Professional Project - SESKA A sophisticated finite element analysis software written in C++ and Fortran for advanced materials testing and computational mechanics applications.

Key Features:

- **Material Damage Mechanics**: Advanced algorithms for material failure analysis and damage progression
- **Viscoplasticity Modeling**: Time-dependent plastic deformation analysis for complex materials
- **Composite Mechanics**: Specialized routines for multi-phase and fiber-reinforced materials
- **High-Performance Computing**: Parallel processing with OpenMPI for large-scale simulations
- **Cross-Platform Support**: Successfully ported to Windows using MSVC++ and MinGW64
- **HPC Integration**: Deployed and optimized for UCT's High-Performance Computing cluster

Technical Achievements:

- **Unique Windows Port**: Challenging implementation leveraging PETSc on Windows with MinGW64
- **Full-Stack Development**: Complete pipeline from scientific research to programming to computational optimization
- **CI/CD Management**: Comprehensive version control and deployment on Bitbucket
- **Library Integration**: Advanced use of OpenMPI, PETSc, MUMPS, ScaLAPACK for parallel computation

Technologies: C++, Fortran, PETSc, OpenMPI, OpenBLAS, ScaLAPACK, MUMPS, METIS, MinGW64, MSVC++, Bitbucket CI/CD, HPC Systems

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SEAT Enrollment Management System

Professional Project - Backend Development Django-based web application for managing student enrollment and academic data.

Key Features:

- RESTful API design for enrollment management
- PostgreSQL database with optimized schemas
- Data validation and integrity checks
- Scalable architecture for educational institutions

Technologies: Python, Django, PostgreSQL, REST APIs

Personal Projects

Datashadric - Data Science Toolkit

A comprehensive Python package for data science, machine learning, statistical analysis, and visualization. Modularly organized for easy use and pip installation.

Features:

- **Machine Learning**: Naive Bayes models, logistic regression, model evaluation
- **Statistical Analysis**: Normality testing, confidence intervals, hypothesis testing
- **Data Manipulation**: Missing value analysis, data cleaning, one-hot encoding

- **Regression Analysis**: OLS modeling with diagnostic checks
- **Visualization**: Box plots, histograms, scatter plots, pairplots

Technologies: Python, Pandas, NumPy, Scikit-learn, Matplotlib, Seaborn, SciPy, Statsmodels

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Custom IP Masks - Privacy Proxy Server

Python Flask

A flexible HTTP/HTTPS proxy server built with Python and Flask for anonymous web browsing and IP masking with advanced privacy features.

Features:

- **IP Masking**: Hide real IP address from target servers
- **Header Sanitization**: Remove privacy-revealing headers automatically
- **User-Agent Rotation**: Automatic rotation to avoid detection
- **Proxy Chaining**: Route traffic through multiple proxy servers
- **Rate Limiting**: Built-in abuse prevention and stability
- **SSL/TLS Support**: Secure encrypted connection handling

Technologies: Python, Flask, HTTP/HTTPS Protocols, SSL/TLS, Network Security

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Basketball Scores - Stochastic and Regression-Based Predictor

Python

Data science project combining **web scraping**, **regression analysis**, and **visualization** for NBA basketball game prediction.

Features:

- **Web scraping** for real-time NBA data
- **Advanced statistical analysis**
- **Machine learning regression models**
- **Data visualization** and analysis
- **Investment decision support** tools

Technologies: Python, Pandas, Scikit-learn, Matplotlib, Web Scraping

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Sequential PDF Merger

Python

A sophisticated **PDF processing tool** with **GUI interface** for merging multiple PDF files with advanced sorting and organization features.

Features:

- **Intelligent file sorting** algorithms
- User-friendly **Tkinter GUI**
- **Batch processing** capabilities
- **PowerShell automation** support and implementation, for producing .exe files for Windows users
- **Cross-platform compatibility**: Works on Windows, Linux, and macOS through the shell as well.

Technologies: Python, PyMuPDF, PyPDF2, Tkinter

A3 to A4 Converter

Python

Automated **document processing tool** for converting scanned A3 pages to A4 format with **intelligent page detection** and splitting.

Features:

- **Automated page size detection**
- **Smart splitting algorithms** based on page size and content-placement
- **Batch processing** for large documents
- **Image processing optimization**

Technologies: Python, PyMuPDF, PyPDF2, Tkinter

Python Data Engineering Collection

Jupyter

Comprehensive repository of **data engineering projects** including **SQL**, **machine learning**, **AI**, and **data analysis** implementations.

Includes:

- **SQL database design** and optimization
- **Machine learning model** implementations and examples
- **Data pipeline architectures**
- **Analysis notebooks** and tutorials

Technologies: Python, SQL

System Management Scripts

PowerShell

Collection of **automation scripts** for **Linux**, **Windows**, and **MSYS64** system administration and management.

Features:

- **Cross-platform compatibility**

- **Automated system maintenance**
- **Performance monitoring** tools
- **Development environment setup**

Technologies: Windows Powershell, Powershell 7+, Bourne-Again Shell

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Simultaneous Equations Solver

Python

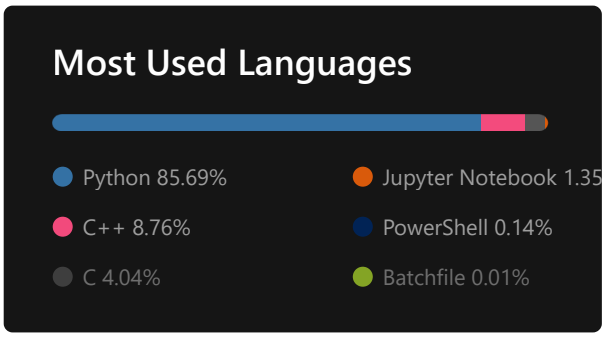
Educational **mathematical tool** for solving systems of **simultaneous equations** with user-friendly input interface.

Features:

- **Multiple equation solving methods** two-variable and three-variable, multiple equation types
- **Step-by-step solution display**
- **Error handling** and validation
- Cross-platform **Mathematics tool** interactable through shell

Technologies: Python Math, NumPy, Linear Algebra

GitHub Statistics



Technical Expertise Areas

Computational Science

- Materials testing and analysis

- Scientific data processing
- Statistical analysis and modeling
- Algorithm development for engineering applications

Data Engineering

- ETL pipeline design and implementation
- Data validation and quality assurance
- Database design and optimization
- Real-time data processing systems

Software Development

- Full-stack web development
- API design and implementation
- Database architecture
- System integration and automation

Machine Learning & AI

- Clustering algorithms (K-means, DBSCAN)
- Outlier detection methods
- Regression analysis and modeling
- Data visualization and interpretation

Current Learning & Development

- Advanced machine learning techniques for materials science
- Cloud computing platforms (AWS, Azure)
- Microservices architecture
- DevOps and CI/CD pipelines
- Advanced PostgreSQL optimization

Let's Connect

I'm always interested in discussing new opportunities, collaboration on interesting projects, or sharing knowledge about computational science and software development.

Professional Interests:

- Materials science computing
- Data engineering and analytics
- Scientific software development
- Educational technology solutions
- Open source contributions

Additional Resources

- 📋 **Download My CV** - Complete professional background and experience - showcasing my skills, certifications and referees!
- 🔗 **GitHub Profile** - Explore all my projects and contributions, perhaps even collaborate on something new!
- 💼 **LinkedIn** - Professional network and updates, and also as a professional instant messaging platform...

"Combining computational science with practical software engineering to solve real-world problems in materials testing, education, and data analysis."