

# Muhammad Bilal

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## EDUCATION

### University of Calgary

*Bachelor of Science, Software Engineering*

Expected April 2027

## EXPERIENCE

### Research Assistant — Sustainable Development

September 2025 – Present

*Supervisor: Prof. Novarun Deb, University of Calgary*

- Experimenting with different LLMs to generate Terraform scripts and comparing their outputs with manually configured setups for platforms like GCP, AWS, and Azure.
- Evaluating the quality and efficiency of AI-generated infrastructure code against production-ready baselines.
- Measuring carbon emissions with CodeCarbon to evaluate the impact of different cloud deployment strategies.

### Backend-Lead

July 2025 – Present

*Enactus, Calgary*

- Leading ongoing backend development for a student learning portal with scalable architecture.
- Integrated Firebase Authentication with MySQL on GCP for seamless user data syncing and management.
- Built FFmpeg-powered video streaming with HLS/DASH formats and multi-quality playback support.
- Building APIs for quizzes, rankings, and course modules using Google Cloud Storage for file handling.

## PROJECTS

### AI-Powered Professor Review Platform | *Flask, Next.js, MySQL*

- Developed a full-stack web application using Flask serving a REST API with Next.js as the frontend.
- Implemented web scraping using BeautifulSoup on RateMyProf and storing it in a MySQL database.
- Enhanced user experience with AI-driven summaries using OpenAI's large language model.

### Movie Theatre Booking System | *Spring Boot, React, MySQL*

- Constructed a responsive, user-friendly interface for seat selection and ticket management.
- Provided exclusive movie access based on user login status using authentication system.
- Built a booking feature that saves the seat and ticket together in MySQL, supports edits/cancels, and prevents double-booking.

### Calgary Subway Screen GUI | *Java-based GUI, MySQL*

- Developed a Java-based GUI with JFrame and JPanel to display train locations, ads, and city updates.
- Integrated MySQL via JDBC for dynamic advertisement storage and retrieval.
- Increased user engagement by delivering live weather and news updates through public APIs.
- Enabled realistic transit monitoring by simulating and visualizing train movement data with a custom engine.

### Defi-Stablecoin – Smart Contract | *Solidity, Ethereum Sepolia*

- Deployed stablecoin protocol with 200% overcollateralization, health factor checks, and liquidation engine.
- Implemented ERC-20 token with secure minting, burning, and transfer using OpenZeppelin.
- Integrated Chainlink oracles for real-time ETH/USD and BTC/USD to maintain USD peg.
- Improved smart contract reliability through a robust testing framework with integration and fuzz testing.

### Rainfall Prediction Model | *Python, Scikit-learn, Pandas, NumPy, Matplotlib*

- Built a machine learning pipeline to predict rainfall using a real-world weather dataset in Australia.
- Applied scalable data preprocessing, cleaning, and feature engineering with Scikit-learn pipelines.
- Trained Logistic Regression, Random Forest, and SVM model, achieving 85% accuracy and 0.87 ROC-AUC.
- Validated model performance using cross-validation, confusion matrices, F1 score and ROC analysis.

## TECHNICAL SKILLS

**Languages:** Python, Java, C/C++, JavaScript, TypeScript, Solidity.

**Frameworks:** React, Next.js, Spring Boot, Flask, Node.js.

**Databases:** MySQL, Firestore.

**Cloud & DevOps:** Google Cloud Platform, AWS, Docker, Kubernetes, Terraform.

**Machine Learning Workflows:** Pandas, NumPy, Data Cleaning, Matplotlib, Scikit-learn Pipelines.

**Tools & Others:** Git, GitHub, REST APIs, FFmpeg, BeautifulSoup, OpenZeppelin, Chainlink oracles, Firebase.