MANIMURUGAN "Mani" ALAGARSAMY

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Experience Summary

Full Stack Principal Engineer with 16+ years of experience in **architecting**, **designing**, **developing**, and **deploying** robust enterprise applications.

- Expertise in leading **cross-functional teams**, architecting complex systems, and utilizing cutting-edge technologies across both **front-end** and **back-end** development.
- Proficient in **Java**, **J2EE**, **Spring Boot**, **Angular/React**, **SOAP**, **RESTful APIs**, and **microservices architecture** (including orchestration), delivering **scalable**, **high-performance solutions**.
- Proficient in **reactive programming** using **Flux** and **Mono** for building **asynchronous**, **non-blocking** applications with **Spring Web Flux**, improving scalability and performance in distributed systems.
- Extensive experience with **cloud technologies (AWS, Terraform, Docker)**, **mobile app development (Ionic-Angular)**, and **data engineering**, enabling modern, cloud-native applications.
- Proven ability to deliver **end-to-end solutions**, collaborate closely with **stakeholders**, and optimize **user experiences** while ensuring **maintainable**, **robust codebases**.
- Demonstrated in executing projects across **diverse domains**, including **mortgage**, **airline**, **retail**, and **media**.
- Skilled in **Agile methodologies**, **TDD**, and **DevOps practices**, ensuring **efficient**, **high-quality** software delivery and continuous improvement.
- Passionate about **mentoring engineers** and fostering a culture of **innovation** in **dynamic**, **fast-paced environments**.

Skills

Programming Language	Core Java8, Java 17, Java Script ES6, Python
J2EE	Servlet, JSP, Struts, JDBC, JAXB, JAX-RS, JAX-WS
Web Libraries	HTML5, CSS3, JQuery, AJAX, AngularJS, Angular, Ionic5, Node JS, Knockout JS, Bootstrap, Vue
Web Services / Messaging	SOAP, RESTFUL API, XML, Kafka, JMS
Frameworks	Hibernate, JPA, Spring Boot, Security/Batch/web Flux
Database	Oracle, Postgresql, MYSQL, DynamoDB, MongoDB
Reporting	MSBI, ETL, SSIS, SSRS
Cloud	AWS, GCP, Terraform
Build Tool	Ant, Maven, NPM, Gradle
Testing	Junit, Mockito, Karate (Gherkin), Postman
Continuous Integration Tools	Hudson, Jenkins (CI/CD), Docker, GitHub Action
Version Control	Bitbucket, Stash, GIT, Team Forge, SVN and Flyway
Tracking	SAFE, Rally, JIRA, Mantis, Confluence, Splunk
IDE	IntelliJ, Eclipse, VS Code, Android Studio, Code
Application & Web Servers	Tomcat, JBoss & Apache, IIS, Nginx
Mobile / Device Management	Android, iOS Swift, Suti Mobi Control
Others	Google Analytics, Openly, SSO (OAuth2, SAML)

Education

Bachelor of Engineering in Electricals and Electronics, Anna University, Tamil Nadu, India

Certification

1. Oracle Certified Java Programmer	4. AWS Certified Solution Architect – Associate
2. Oracle Certified Web Component Developer	5. Terraform Associate
3. Oracle Certified Web Service Developer	6. Google Cloud Certified Architect – Associate

Underwriting Transformation - Fannie Mae – USA Sep 2022 – Till Date

Fannie Mae loans underwriting involves evaluating the borrower's creditworthiness, income, assets, and the property itself to ensure they meet Fannie Mae's eligibility criteria

Technology: Java 8, Java 17, J2EE, Spring Boot, Chassis Framework, DynamoDB, Mockito, Karate, Gradle, XML, JSON, MapStruct, AWS, Terraform, Docker, Jenkins, Splunk, IntelliJ, Bitbucket, Git, Sonar, Jira, Confluence, Postman

Key Achievements & Strategic Impact: Senior Consultant

- Architected a **highly scalable, resilient microservices system** using **Spring Boot** and the **Chassis Framework**, enabling rapid development cycles and seamless deployment of independent services. This architecture **accelerated time-to-market** and ensured future-proof scalability for the business.
- Designed and developed **scalable and maintainable RESTful APIs** with a focus on consistency and efficient inter-service communication. These APIs supported key business operations and contributed to improved integration across the organization's digital ecosystem.
- Orchestrated complex API interactions using **reactive streams** (Flux/Mono) to enable **asynchronous, non-blocking data processing**, significantly improving the application's responsiveness and reducing server resource consumption by **30%** during peak usage.
- Led the adoption of **MapStruct** for **automated, type-safe data mapping** between Java objects in a microservices architecture. This decision resulted in **improved maintainability** and **reduced boilerplate code** by 50%, allowing the team to focus on core business logic. The use of MapStruct optimized data transformation processes, reducing **integration errors** and ensuring **data consistency** across services, which directly contributed to **faster feature delivery** and **improved system reliability**.
- Led the implementation of **advanced fault tolerance** patterns (**circuit breakers, retries, timeouts**) to ensure **99.99% uptime** across critical services, enhancing system reliability and providing a **robust foundation for business-critical applications**.
- Directed the successful migration of the application from **Java 8 to Java 17**, optimizing the application's performance and leveraging the latest language features for greater maintainability and long-term scalability. This upgrade contributed to a **25% improvement in execution speed** and **enhanced developer productivity**.
- Led the **integration of Amazon Kinesis Streams** and **DynamoDB**, designing an event-driven architecture that provided real-time data processing, enhancing the company's ability to respond quickly to business needs and improving **operational scalability** by 40%.
- Championed the adoption of **Karate Framework** with **Gherkin syntax** for **behavior-driven development (BDD)**, automating comprehensive component testing for API endpoints. This ensured **strict compliance with business requirements** and improved **system stability** by identifying issues early in the development lifecycle. The implementation led to **faster release cycles**, a **25% reduction in production defects**, and enhanced collaboration between technical and business teams due to clear, understandable test scenarios.
- Implemented **reflection-based data validation**, allowing for dynamic data consistency checks without repetitive code. This not only simplified the codebase but also led to a **15% reduction in validation-related bugs**.
- Spearheaded initiatives to optimize cloud resource utilization, including **ECS auto-scaling and ECS Farmgate**. These efforts reduced AWS infrastructure costs by **30%** while ensuring dynamic scaling based on traffic demands. Similarly, **DynamoDB on-demand mode** and **auto-scaling** led to a **20% reduction in database costs**, resulting in significant cloud savings.
- Implemented **advanced caching strategies** using **Caffeine** and **Redis**, which significantly reduced database load and enhanced system performance. These optimizations reduced **response times by 40%** and resulted in **30% lower infrastructure costs** due to fewer backend queries.
- Championed **Test-Driven Development (TDD)** practices across the team, ensuring high reliability through comprehensive unit testing with **JUnit, Mockito**. Integrated **SonarQube** for continuous code quality checks to ensure high-quality code by identifying **code smells**, **vulnerabilities** achieving **a 20% reduction in production defects** and improving the maintainability of the codebase.
- Led the containerization of microservices using **Docker** and orchestrated automated deployment pipelines with **AWS ECS, Jenkins**, and **Terraform**, enabling **continuous, fast, and reliable releases**. This transformation streamlined deployment times by **50%** and ensured **scalable, cost-efficient** operations in

the cloud.

- Collaborated closely with **product owners**, and **business teams** to translate complex business requirements into **technical solutions that aligned with broader business goals**, driving **value-driven development** that directly impacted customer satisfaction and revenue growth.
- Implemented **real-time monitoring** with **Splunk** and **Dynatrace**, identifying bottlenecks and system inefficiencies. This proactive monitoring led to a **25% reduction in incidents** and optimized overall system performance.
- Led and participated in **Agile Scrum ceremonies** (backlog grooming, sprint planning), ensuring alignment with business priorities and delivering frequent, high-value increments. This fostered a **collaborative, high-performance engineering culture** and contributed to a **15% increase in team velocity**.

Launchpad - FIS Global - USA July 2020 – July 2022

Launchpad is a merchant onboarding platform, the on boarded merchant will use WorldPay payment solutions. Launchpad has provision for Partner to generate leads, saving the leads data in database, sync with salesforce, sending the merchant application for underwriting verification and finally onboarding merchant. For this process to work, Launchpad has various experience models for various types of merchants depends on the merchant business.

Technology: Core Java11, J2EE, Springboot 2.2, Spring (Security/Batch), JMS, Hibernate 4, SQL Server, PMD, Toad, IDP SSO, Jenkins (CI/CD), Tomcat, NodeJS, Ionic5, Angular8, JSLint, SAFE, Rally, Agile

Roles & Responsibilities: Principal Engineer/ Sr Technical Lead / Lead Full Stack Developer

- Led the migration of **legacy applications** to a **microservices architecture** utilizing **REST APIs**, **Spring Boot**, **JPA**, and **MSSQL**, enabling scalable, maintainable systems.
- Designed and developed **user interfaces** using **Angular 8**, **Ionic 5**, **HTML5**, **CSS3**, **Bootstrap**, and **Angular Material**, ensuring a seamless user experience across platforms.
- Actively participated in **Program Increment (PI) Planning** sessions, ensuring alignment of development efforts with business goals. Followed **SAFe Agile** methodology, conducting **daily SCRUM** meetings and sprint retrospectives to address progress and technical challenges.
- Managed and optimized **CI/CD** processes using **Jenkins**, enabling automated testing and deployment pipelines that streamlined code release cycles.
- Developed custom **annotations** for **encryption**, **decryption**, and **field masking**, reducing boilerplate code and enhancing the security of sensitive data.
- Utilized **Checkmarx** and **Black Duck** to perform static and dynamic analysis, ensuring that source code was free from **security vulnerabilities** and compliant with industry standards. Worked proactively with development teams to implement best practices for **secure coding**, ensuring **data protection** and **secure transactions** across applications.
- Conducted thorough **peer code reviews** to maintain high-quality code standards. Mentored junior developers and provided guidance on best practices, architectural decisions, and implementation strategies.
- Assisted in **production support**, quickly diagnosing and resolving production issues, ensuring minimal downtime and high system reliability.
- Utilized **JUnit**, **Mockito**, **Jasmine**, and **Karma** to perform unit and integration testing, ensuring robust and reliable application behavior.
- Documented **APIs** using **Swagger** (OpenAPI), enabling ease of integration with third-party services and other internal teams.

PAC Plus - negate Solutions - Gate Gourmet Inc, USA October 2019 – May 2020

PAC Plus Mobile application to manage warehouse operation which includes inventory, barest, trolley tracking and traceability. The “PAC Plus” Product is intended to meet the core counting, packing and associated database integration demands in gate group warehouses worldwide. The scope of the initial project is designed to capture data associated with retail program goods receipt, stock movements within the warehouse and between warehouses, and mass inventory; and to manage the workflow for inbound and outbound retail cart packing to templates.

Technology: Java8, J2EE, Android, iOS, Spring, Springboot 2.2, Microservices, Hibernate, Postgresql, HTML5, CSS3, Bootstrap, Jenkins (CI/CD), Tomcat8, AWS, AirWatch/SOTI (MDM), JIRA and Confluence

Roles & Responsibilities: Technical Lead & Full Stack Developer

- Led the backend development using **Spring Boot** and **Microservices** architecture, with **PostgreSQL** as the database, ensuring scalability, security, and performance.
- Designed and developed **native Android** (Java) and **iOS** (Swift) applications for mobile users, ensuring smooth user experiences and integration with backend services.
- Managed **mobile device configurations**, releases, and app deployment through **SOTI** and **AirWatch** MDM solutions, ensuring devices were secured, updated, and compliant.
- Oversaw the **CI/CD pipeline**, managing the deployment process using **Jenkins**, **Flyway** for database migrations, and **AWS Lambda** for serverless functions.
- Played an active role in **Agile development** cycles, including sprint planning, backlog grooming, and standups. Ensured iterative development and rapid delivery of features.
- Coordinated with clients to define and finalize project requirements and scope, ensuring clear understanding between technical teams and stakeholders.
- Supported **User Acceptance Testing (UAT)** activities and played a key role in the **Go-Live** process, providing end-user training, particularly in **warehouse environments**.
- Identified and optimized performance bottlenecks in mobile app development and backend services, ensuring a responsive, high-performance solution.
- Identified opportunities for automating development and deployment tasks, resulting in significant reductions in manual intervention and quicker release cycles.
- Provided technical training and mentorship to junior developers and conducted code reviews to ensure adherence to best practices.

TS5 - eGate Solutions - Gate Gourmet Inc, USA — February 2016 – September 2019

Total Sales (TS)™ is a web-based product for handling onboard sales. The product is being used by more than 20 airlines and railways around the world. This application enables to effectively plan, manage, promote and sell onboard offerings by giving tools and intelligence needed to control inventory, optimize food and service sales.

Technology: Java8, J2EE, Spring, Spring Boot2, SOAP, REST API, JMS, Hibernate, Postgresql, JNDI, jQuery, Angular JS, Junit, Jenkins (CI), Tomcat8, Apache, AWS, Micro Services, JIRA**,** MDM (SOTI v14), Flyway, Eclipse

Roles & Responsibilities: Technical Lead & Lead Developer

- Managed day-to-day development activities, led a team of developers, and ensured adherence to project timelines and quality standards.
- Worked closely with clients and stakeholders to gather requirements, provide input on **design** and **architecture**, and ensure that the application met business needs.
- Designed and developed both **frontend** and **backend** components of the web application using **AngularJS**, **Spring Boot**, **Hibernate**, and **PostgreSQL**.
- Led the design and implementation of a **Microservices-based architecture**, facilitating scalability and flexibility in deploying new features.
- Managed **EPOS devices** (mobiles) using **SOTI v14**, ensuring that devices were properly configured, monitored, and secured for use across the enterprise environment.
- Developed **RESTful APIs** and integrated with **SOAP** and **JMS** services to facilitate communication between microservices and external systems.
- Set up and maintained **CI/CD environments** using **Jenkins**, automating build, test, and deployment pipelines to streamline development cycles and reduce manual intervention.
- Utilized **Flyway** for **database migrations** & managed **PostgreSQL** instances for reliable and efficient data storage.
- Coordinated with clients to clarify and finalize requirements, ensuring that all technical solutions met user needs and business goals.
- Led the team in **Agile** development practices, with sprint planning, backlog refinement, and daily stand-ups to ensure timely delivery of project milestones.
- Identified areas for improvement in development processes and implemented **automation** of routine tasks, significantly improving team productivity.
  Ensured the quality of code by conducting **code reviews**, writing unit tests with **JUnit**, and ensuring high standards of software development.

NYU – Knowledge Commons, USA October 2014 – January 2016

The Knowledge Commons is a virtual gathering place for all present and past members of the NYU community--a place to share ideas, to teach and learn. It's your space to make and keep the personal and professional connections that comprise the most diverse and dynamic global institution of higher learning.

Technology: Java, J2EE, Liferay-portal, S3, MySQL, Resource Space, WSO2 ESB, Shibboleth, Jenkins, Tomcat & Apache

Roles & Responsibilities: Technical Lead & Developers

- Contributed to gathering and defining business and technical requirements for the enterprise application, ensuring alignment with user needs and security standards.
- Designed the overall **application architecture**, ensuring that it was robust, scalable, and secure. Focused on integrating **Liferay-portal** with **WSO2 ESB** and **Shibboleth** for **single sign-on (SSO)** capabilities.
- Led the integration of **Shibboleth SSO** to provide secure, centralized authentication across multiple platforms, enabling seamless user experiences.
- Worked on integrating **Amazon S3** for cloud storage, managing file uploads, storage, and retrieval processes. Utilized **WSO2 ESB** for orchestrating data flows between application components and external services.
- Developed **web services** (REST/SOAP) using **Java/J2EE** to facilitate seamless communication between internal systems and external services.
- Participated in file processing tasks using **Resource Space** and **WSO2 ESB**, enabling efficient storage and retrieval of media and documents in **Amazon S3**.
- Managed **Tomcat** and **Apache** server instances, ensuring optimal configuration, load balancing, and server health for production environments.
- Oversaw the **setup of cloud environments** and continuous integration **(CI)**/continuous delivery **(CD)** pipelines using **Jenkins**, automating build, testing, and deployment processes for **development, QA, UAT, and production** environments.
- Led **release management** activities, ensuring the smooth deployment and rollback of application versions across multiple environments.
- Coordinated with development teams to ensure timely delivery of milestones and conducted code reviews to maintain high standards of code quality.

Ad Council – Cross Media Analytics, USA October 2012 – January 2016

Cross media analytics solution is a centralized Enterprise level Business Intelligence platform that can store and manage all donated media data as well as key campaign fulfillment and research results. Ad Council also wants an intuitive web-based user interface that enables sponsors and Ad Council staff to access the data and results via a set of automated reports, charts and tables.

Technology: Java, J2EE, Spring MVC, Spring IOC, Hibernate, and MS SQL 2012**,** Apache, IIS and Tomcat. Google Analytics, Fusion Chart and MSBI – SSIS/SSRS

Roles & Responsibilities: Technical Lead & Developer

- Served as the lead developer for the **PS Analytics web interface team**, guiding the development of the front-end and back-end components of the application.
- Contributed to the **requirements gathering** and **technical specifications** for the project, working closely with stakeholders to understand business needs and translate them into technical solutions.
- Led the **design** and **architecture** of the application, ensuring that it was scalable, maintainable, and capable of integrating various data sources for cross-platform analytics.
- Utilized **J2EE** and **Spring MVC** to design the backend architecture, leveraging **Spring IOC** for dependency injection and **Hibernate** for database interactions with **MS SQL 2012**.
- Developed the user interface using **JQuery** and integrated **Fusion Charts** for dynamic data visualization, enabling users to generate insightful reports and dashboards.
- Integrated **Google Analytics** into the platform for generating custom reports and providing real-time insights into user behavior across various channels.
- Implemented file processing operations and integrated data from multiple sources to ensure seamless data flow and synchronization across the platform.
- Managed the **application server instances** (Apache, IIS, Tomcat) and handled the **release management**

process to ensure smooth deployment and updates to production.
- Oversaw the **setup of cloud environments** for the development, QA, UAT, and production stages, ensuring scalable infrastructure to meet growing business needs.
- Led a team of developers, overseeing the development process, ensuring timely delivery of milestones, and conducting code reviews to maintain high-quality standards.
- Integrated **MSBI (SSIS/SSRS)** for advanced reporting and data integration, enabling the generation of comprehensive, custom reports for business stakeholders.

Sentiment Interpreter Tool – Product Development — October 2013 – January 2016

Social Media has become a major platform for customer expressions. This is the new age virtual world where customers meet, discuss and express. Hence to understand the customer's needs better and fill the gap between customer expectations and existing services, these expressions need to be Captured, Analyzed and Visualized.

Technology: Java, J2EE, Spring MVC, Spring IOC, Hibernate, and MYSQL, Open NLP, JQuery, Mantis, D3Chart, Apache 2.2, and Tomcat.

Roles & Responsibilities: Technical Lead & Developer

- Participated in gathering business requirements and documented technical specifications to guide the development of the sentiment analysis tool.
- Led the design and architecture of the application, ensuring scalability, performance, and flexibility to handle large-scale data processing.
- Utilized **core Java** techniques such as **multithreading**, **file I/O**, **concurrency**, and **Collections Framework** to process large volumes of text data in parallel. Optimized the application's efficiency using **thread executors** for task management and resource allocation.
- Implemented **Open NLP** for natural language processing tasks, such as tokenization, part-of-speech tagging, and Text mining, sentiment extraction. Applied these methods to mine and analyze social media data for sentiment trends.
- Developed the frontend interface using **Spring MVC**, **JQuery**, **Bootstrap**, and **D3Chart** for data visualization. The interface presented sentiment data in interactive charts and graphs for better decision-making.
- Developed **social media data extraction** modules that retrieved posts, comments, and user interactions from **Facebook** and **Twitter** using APIs. Employed multithreading for efficient data scraping and processing.
- Designed file processing operations using **thread executors** to handle high-volume, multi-file data extraction and processing.
- Led the setup and configuration of **cloud environments** for **development** and **QA**, enabling a streamlined deployment pipeline for the application.
- Oversaw the **release management** and **application server instance** management on **Tomcat** and **Apache** to ensure smooth deployment and server configuration.
  Coordinated and led the development efforts between the **offshore** and **onsite** teams, ensuring that milestones were met and best practices were followed.

IFX - ergate Solutions - Gate Gourmet, USA — April 2009 - September 2012

In-Flight Exchange is the airline industry's first centralized, web-based communication platform for airlines and their in-flight supply chain enterprise application.

Interface: *Designed customized interfaces which intermediates IFX4 applications and the AIRLINE system. Build & Release Management: Customized, automated and continues deployment of IFX4 applications using ant, JBoss & Hudson Web Method. Automated using java, j2ee and web methods*

Technology: Java, J2EE, Spring MVC, Hibernate, EJB, JMS, XML, DOM, SAX, Log4j, SOAP Web Services, Axis2, WSDL, Web Methods, Oracle 10g, Apache 2.0, JBoss 4.2.2 GA, Hudson, GIT and SVN

Roles & Responsibilities: Senior Developer

- Developed interfaces using **Java**, **J2EE**, **WebMethods**, and **Quartz Scheduler** for automated time-based processing. Used **WSDL** to define web service interfaces and **FTP** for file transfer integration.
- Created and maintained **SOAP-based web services** using **Axis2** and **JAXB** for XML data binding. These web services facilitated secure and reliable communication between heterogeneous systems.
- Contributed to the preparation of **High-Level Design (HLD)** and **Low-Level Design (LLD)** documentation, ensuring alignment with business requirements and technical specifications.

- Led the configuration management activities with **SVN** for version control and **Hudson** for automating build and deployment processes. Reduced build times by optimizing continuous integration pipelines.
- Managed the **JBoss Application Server** and **Apache Web Server**, implemented clusters on all environments, ensuring optimal performance, fault tolerance, and scalability.
- Oversaw the management of over **140+ interfaces** within **WebMethods 6.5**, ensuring that interfaces were properly configured, tested, and deployed in a timely manner.
- Coordinated development activities across **Offshore** and **Onsite** teams, ensuring smooth communication and efficient delivery of tasks. Conducted regular reviews and provided technical guidance.

BirdView Technologies, Texas, USA — January 2009 – April 2009

Bird View application is a Real Estate application, A Consumer who wants to buy or sell property accesses the website of an Office or Agent and transparently views customized pages on the BirdView website.

Technology: Java, J2EE, Spring Kodo, Postgres & Tomcat

Roles & Responsibilities: Developer

- Developed a scheduling system that leveraged **Java** and **cron** for automating background tasks. Tasks were triggered at specific times or intervals based on user-defined configurations.
- Designed and implemented **Controller** and **View** components using **Spring MVC** to handle user interactions in the web application. The system allowed users to configure and view task schedules via an intuitive interface.
- Utilized **Postgres** and **Kodo (a J2EE ORM)** to manage task data, user configurations, and logs. Implemented **CRUD** operations to handle task scheduling, updates, and execution logs efficiently.
- Ensured input integrity by implementing **Regular Expressions** and **Java** validation techniques to verify user input before submission, preventing incorrect or incomplete data entries.
- Deployed the application to **Apache Tomcat**, ensuring proper integration of Java-based web components and configuring Tomcat for seamless handling of HTTP requests.
- Conducted performance testing to ensure the scheduling system could handle high loads and multiple concurrent tasks, optimizing database queries and Java code for improved efficiency.

GBST – Honeywell BOEING, USA — July 2008 – January 2009

The Ground Based Software Tool (GBST) is a software package that operates on a workstation and lets on airline make Airline-Modifiable Information (AMI) for six Airplane Information Management Systems (AIMS) software functions such as ACMF, CMCF, DCMF, FDCF, FMCF, ECL.GBST is collection of Honeywell-developed and public domain software that operates on a Sun Workstation and is supplied to all Boeing777 airplane customers. GBST is one of the pilot interfaces. Using these interface pilot and ground Station airline members will communicate about status and requirement. All communication is secured.

FMCF: Its gets data from airplane systems about weight, speed, direction, altitude, fuel, configuration, positions, and engines. It is used to calculate flight altitudes, estimated times of arrival, airplane position, flight route, and other performance and navigation data.

Technology: Java, JSP, Ajax, JavaScript, Ingress Database & Tomcat

Roles & Responsibilities: Developer

- Involved in designing and developing the controller and view layers of the application, ensuring a clean separation of concerns. The model-view-controller (MVC) architecture was used to separate business logic, presentation, and data access layers.
- Implemented the Data Access Object (DAO) design pattern for efficient data handling. This improved code maintainability and scalability by encapsulating database access logic and separating it from business logic.
- Developed client-side validation using JavaScript to ensure correct data entry and enhance user experience. This validation prevented invalid data from being submitted to the server.
- Used Ajax to update parts of the page dynamically, allowing users to interact with the system without refreshing the entire page.
- Integrated Ingress Database to store product information, customer details, and order data. Developed SQL queries to handle CRUD operations and optimize database access.
  Deployed the application on Apache Tomcat, configuring the server for optimal performance and scalability.