

# National Apprentice & Industrial Training Authority

## Report on Industrial Training At Variosystems (Pvt) Ltd



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I am especially thankful to Variosystems (Pvt) Ltd. for offering me the opportunity to complete a comprehensive 24-week internship program. I sincerely appreciate the continuous guidance, support, and encouragement extended to me by the entire development team of the Variosystems IT Department during my training.

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I am also deeply grateful to my parents for their unwavering support and encouragement throughout my academic and professional journey. Their belief in my potential has been a constant source of motivation.

This training experience has marked a significant step in my professional growth. The exposure to real-world projects, industry tools, and collaborative work environments has not only strengthened my technical competencies but also laid a solid foundation for my future career endeavors.

I extend my sincere thanks to everyone who contributed to making this industrial training a meaningful, productive, and enriching experience.

## Preface

This report has been prepared as a requirement of the BSc.Eng. (Computer Engineering) Degree Program at the Faculty of Engineering, University of Jaffna, and presents the knowledge, experience, and insights I gained during my 24-week industrial training at Variosystems (Pvt) Ltd., conducted from 17th February 2025 to 4th August 2025.

The purpose of this report is to document and reflect upon the practical training I received during my internship, which was undertaken in the role of a Software Developer Intern. During this period, I had the opportunity to actively contribute to the development of web-based applications focused on improving the internal operations of the Sales and Human Resources (HR) departments.

Through this hands-on experience, I was able to bridge the gap between academic theory and industry practice by working with both front-end technologies (user interfaces) and back-end technologies (server-side logic, databases, and processing) to design and develop intranet workspace tools. The training was thoughtfully structured to provide in-depth exposure to real-world software development workflows, collaborative team environments, agile methodologies, and enterprise-grade tools.

This report aims to provide a detailed account of the training activities, projects undertaken, skills developed, and the overall professional growth achieved during this period. It represents a significant step forward in my journey toward becoming a competent and industry-ready computer engineering professional.

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## Abbreviations

- API – Application Programming Interface
- CAPA – Corrective and Preventive Action
- DTO – Data Transfer Object
- E2E – End-to-End
- EF Core – Entity Framework Core
- EMS – Environmental Management System
- EPF – Employees' Provident Fund
- ERP – Enterprise Resource Planning
- ESD – Electrostatic Discharge
- ETF – Employees' Trust Fund
- HR – Human Resources
- HSE – Health, Safety, and Environment
- IDE – Integrated Development Environment
- IMS – Integrated Management System
- ISO – International Organization for Standardization
- JIRA – Project Management & Issue Tracking Tool
- NAITA – National Apprentice and Industrial Training Authority
- OH&S – Occupational Health and Safety
- PCBA – Printed Circuit Board Assembly
- PPE – Personal Protective Equipment
- QMS – Quality Management System
- RFID – Radio Frequency Identification
- SOP – Standard Operating Procedure
- SQL – Structured Query Language
- THT – Through-Hole Technology
- UI – User Interface
- VSAG – Variosystems AG
- WASM – WebAssembly

## **Chapter 1 - Introduction About Training Institute**



Fig.1: Variosystems logo

Variosystems was founded in 1993 in Switzerland by Peter Germann, Peter Ermish, and Norbert Bachstein, beginning as a small regional electronic manufacturer. Over the years, the company expanded rapidly across Europe, Asia, and the United States, reinvesting profits to establish modern plants and facilities. Today, Variosystems operates globally with production sites in Switzerland, the United States, Mexico, Croatia, Sri Lanka, and China, serving industries such as medical, aerospace, automotive, defense, telecommunications, renewable energy, and consumer electronics.

Variosystems Sri Lanka, established in 1998 and fully acquired in 2003, operates a state-of-the-art facility in Badalgama with advanced manufacturing capabilities including SMT, THT, box-build, wire harness, system integration, and testing. The plant is ISO-certified (ISO 9001, ISO 14001, ISO 45001, ISO 13485) and emphasizes both sustainability and employee welfare.

The IT department of Variosystems manages hardware, software, and networks, ensures data security, provides employee support, and develops technology solutions, thereby enabling efficiency, security, and innovation while supporting both daily operations and long-term strategic growth.

During my internship, I gained valuable hands-on experience in backend web development, including server-side programming, database management, and API integration. Attending development meetings and working with Jira tasks helped me understand requirement analysis and the importance of communication. Teamwork played a vital role, strengthening both my technical expertise and interpersonal skills. The internship provided practical exposure to real-world project execution and client-oriented development within a global organization.

In the following chapters, I will outline my training objectives, contributions to projects, and the skills I acquired during this enriching experience.

## 1.1 Organizational chart

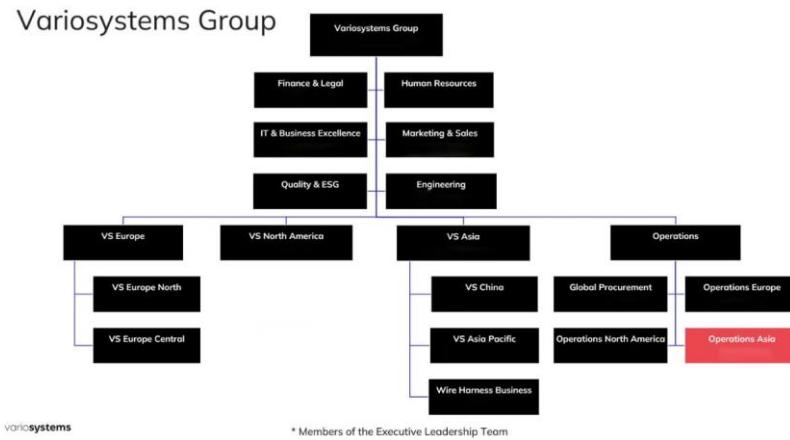


Fig.2: Organization Structure – Variosystems group

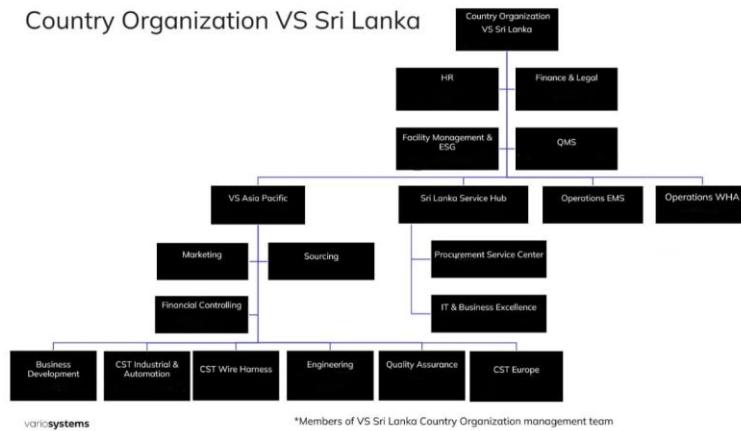


Fig.3: Organization Structure - Country Organization VS Sri Lanka

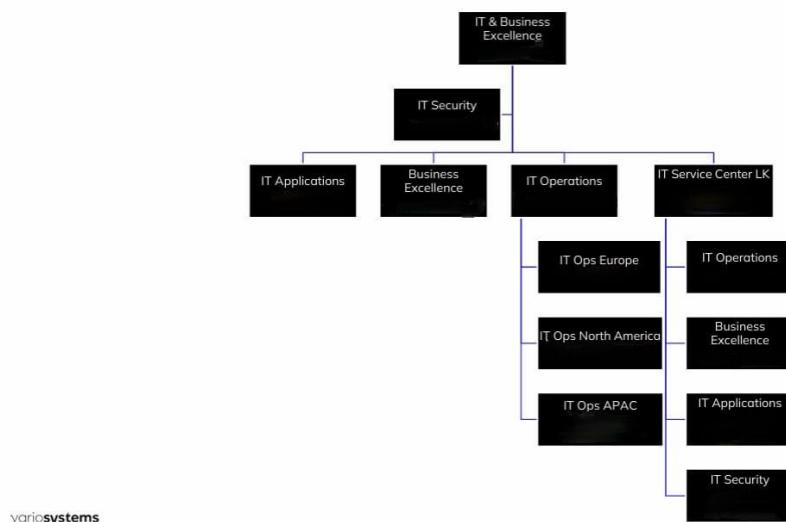


Fig.4 Organization Structure – IT & Business Excellence

## 1.2 Nature of business

Variosystems (Pvt) Ltd is a global Electronics Manufacturing Services (EMS) provider delivering end-to-end solutions from design and development to manufacturing, testing, and after-sales services. Core offerings include PCB assembly (SMT/THT), wire harness manufacturing, box-building & system integration, conformal coating/potting, and comprehensive testing. The company serves industries such as medical, aerospace, defense, automotive, telecommunications, and industrial automation, with operations across Switzerland, USA, Mexico, Croatia, Sri Lanka, and China.

The Sri Lanka facility in Badalgama is a 20-acre, ISO-certified plant producing to IPC standards, with a strong focus on sustainability, quality, and employee welfare.

The IT department plays a vital role by managing global infrastructure, ensuring security, supporting applications and operations, and driving innovation, enabling efficiency in daily operations and supporting long-term business growth.



Fig.5: printed circuit board assemblies (PCBA)

## 1.3 Co-operate plan

### 1.3.1 Vision

To be the most trusted and sustainable electronics services partner.

### 1.3.2 Mission

#### Customer Satisfaction

Create outstanding customer experiences along the entire electronics value chain, through solution-oriented approach, global presence, and dedicated local teams in close partnership with customers.

#### Value-Driven Culture

A unique, inclusive, and value-driven culture fosters a work environment for trust, collaboration, connection, and shared learning that results in organizational readiness and resilience.

#### Operations Excellence

With globally harmonized, digitized, and connected production facilities and supply chains, ensure excellence in on-time delivery, flexibility, costs, and quality, to proactively advance customers' success.

#### Sustainable Growth

Focus on profitable and sustainable growth, while using resources and treating the environment responsibly when empowering customers to build a better future together.

### 1.3.3 Core Values of the Company

#### Integrity:

- Our employee, customer and supplier relationships are nurtured by respect, approachability and mutual trust.
- We demonstrate reliability through clear definition of roles and responsibilities and a strong attitude of ownership.

- We value and practice transparency, honesty and appreciation in how we communicate and present ourselves.

Courage:

- We take calculated risks and bold steps to support our customers' success.
- We embrace change, think outside the box, try new things, and regularly leave our comfort zone.
- We seek honest and constant feedback, admit when something went wrong, and learn from our experiences.

Responsibility:

- We take ownership and are accountable for our actions, behaviors and results.
- We make sound decisions and deliver what we have committed to.
- We strive for sustainable growth while ensuring respect for our resources and our environment.

#### 1.3.4 Goals

- Deliver exceptional customer satisfaction through innovation and service.
- Achieve operational excellence via efficient, digitized global processes.
- Build a collaborative, value-driven culture empowering employees.
- Ensure sustainable growth with responsible resources and environmental management.
- Foster technological innovation to remain competitive.
- Strengthening global trust and reputation as a reliable electronics partner.

#### 1.3.5 Objectives

- Maintain ISO certifications and improve quality standards.
- Develop employees with training, welfare, and leadership opportunities.
- Promote sustainability through renewable energy, waste reduction, and green standards.

- Ensure workplace health and safety with PPE and emergency preparedness.
- Expand production, adopt advanced technologies, and grow global facilities.
- Support community and social development programs.

### 1.3.6 Number of employees

- Variosystems Sri Lanka employs over 800 employees.
- The workforce is structured across several key departments:
  - Production & Assembly: Operators, technicians, section leaders (PCB assembly, wire harnessing, system integration).
  - Engineering & Quality Assurance: Engineers, QA specialists (design support, process monitoring, testing, compliance).
  - Supply Chain & Logistics: Procurement, warehouse, distribution.
  - Human Resources & Administration: Employee welfare, recruitment, policies.
  - Finance Department: Financial management.
  - IT Department: Technological infrastructure, support, data security, system development.
- Mix of permanent, probationary, and contract employees.
- Significant proportion of female employees in production roles.
- Recruitment from local communities, universities, and technical colleges.



Fig.6: Variosystems private limited – Badalgama Location

## **IT Department (Sri Lanka)**

- Total Members: **24**
  - Head of Global IT Shared Service Center – 1
  - IT Applications – 10
  - IT Operations – 8
  - IT Business Enablement – 3
  - IT Security – 2
- Supports daily operations and long-term organizational growth.

### **1.4 Management styles / Administrative practices**

Variosystems applies a structured and systems-based management approach designed to ensure compliance, accountability, and continuous improvement across all operations. The company's management system is aligned with the Code of Conduct and is built on internationally recognized standards. Its primary objectives are:

- Compliance with laws, regulations, and customer requirements.
- Conformance with company policies and codes.
- Identification, control, and mitigation of operational risks.
- Facilitation of ongoing improvement.

The management system is composed of the following elements:

- Company Commitment – Executive management issues corporate policies committing to social and environmental responsibility, legal compliance, and continuous improvement.
- Management Accountability and Responsibility – Designated representatives oversee implementation, while auditors regularly review the system's performance.
- Legal and Customer Requirements – Established processes monitor and interpret laws, regulations, and customer-specific requirements.
- Risk Assessment and Management – Risks relating to environmental impact, health and safety, labor practices, and ethics are identified, evaluated, and controlled through preventive and corrective measures.

- Improvement Objectives – Written objectives, targets, and action plans are set by executives, with periodic reviews of progress and outcomes.
- Training – Structured training programs for managers and workers ensure policies, procedures, and compliance requirements are understood and applied.
- Communication – Information on policies, expectations, and performance is communicated clearly to workers, suppliers, and customers.
- Worker Feedback, Participation, and Grievance Mechanisms – Employees have access to formal grievance systems, and their feedback contributes to continual improvement.
- Audits and Assessments – Periodic self-assessments ensure conformity with regulatory, customer, and internal requirements.
- Corrective Action Process – A defined system ensures timely correction of deficiencies identified through audits, inspections, or investigations.
- Documentation and Records – Records are maintained to demonstrate compliance and conformity, with confidentiality and privacy safeguarded.
- Supplier Responsibility – Requirements of the Code of Conduct are communicated to suppliers, and compliance is actively monitored.

#### 1.4.1 Leave

Variosystems maintains a structured and transparent leave policy that complies with Sri Lankan labor laws and supports both employee well-being and operational efficiency. The key categories of leave are as follows:

- Annual Leave
  - Available to confirmed employees after completing 12 months of service.
  - Entitlement is generally 14 working days per year (as stated in appointment letters/HR records).
  - Must be applied for in advance and approved by the immediate supervisor or departmental head.

- Unused leave may lapse at the end of the year unless otherwise authorized.
- Casual Leave
  - Employees are entitled to 7 days per year.
  - Granted for urgent personal needs such as family emergencies or short-term obligations.
  - Requests must be applied and approved by the supervisor.
  - In emergencies, notification via phone or email is acceptable.
- Medical / Sick Leave
  - Employees are entitled to 7 days per year.
  - Can be taken for illness, medical treatment, or recovery.
  - If absence exceeds two consecutive days, a medical certificate from a registered practitioner must be submitted.
  - Employees injured in workplace accidents may also be covered under the company's medical insurance scheme.
- Maternity Leave
  - Female employees are entitled to 84 working days in accordance with Sri Lankan labor laws (before and after childbirth).
  - Additional unpaid leave may be granted based on management approval.
- Paternity Leave
  - Male employees are provided leave during childbirth to support their families, in line with statutory requirements.

- No-Pay Leave (Unpaid Leave)
  - Employees may apply for unpaid leave if annual, casual, or medical leave balances are exhausted.
  - Approval is subject to management discretion.
  - Frequent usage may impact performance evaluations and certain allowances.
- Special Leave
  - Granted under exceptional situations such as:
    - Compassionate Leave – in case of the death of a family member.
    - Marriage Leave – for employees getting married.
    - Study Leave – for attending examinations or training programs.
- Public Holidays
  - All government-declared public holidays in Sri Lanka are observed (e.g., Poya days, Sinhala & Tamil New Year, Vesak, Christmas, Independence Day).
  - Employees required to work on a public holiday are compensated with either holiday allowance or substitute leave.

## 1.4.2 EPF (Employee Provident Fund)

Variosystems ensures the long-term financial security of its employees by participating in Sri Lanka's compulsory retirement savings scheme, the Employee Provident Fund (EPF). The EPF operates on a shared-contribution model: the employer contributes 12% of the employee's basic salary, while the employee contributes 8%, which is deducted from monthly pay. These combined contributions are remitted to the Central Bank-administered EPF and earn interest, allowing balances to grow over time through both deposits and credited returns.

In practice, the company prioritizes accuracy and timeliness in every remittance cycle and maintains transparent records so employees can clearly track their deductions and the employer's contributions. The accumulated EPF balance provides a reliable financial cushion that can be accessed at retirement or resignation, and—subject to statutory conditions—through special withdrawals such as for approved medical needs or housing. By coupling strict compliance with Sri Lankan labor regulations and clear employee communication, Variosystems enables staff to plan confidently for long-term financial stability and retirement security.

## 1.4.3 ETF (Employee Trust Fund)

In addition to the EPF, Variosystems contributes to the Employee Trust Fund (ETF) as part of its broader commitment to employee welfare. Unlike the EPF, the ETF is funded entirely by the employer, with 3% of the employee's basic salary contributed monthly. Employees themselves are not required to make any contribution. These payments are deposited into the ETF account, where they accumulate along with interest, creating an additional layer of financial security for employees.

The ETF not only serves as a supplementary savings mechanism but also offers employees access to a range of welfare benefits. These include educational scholarships for children, medical benefits, and financial assistance in cases of disability. Employees may withdraw their ETF balance upon retirement, resignation, or under specific government-approved

circumstances, making it both a long-term savings tool and a practical welfare support system during their working years.

By ensuring timely and consistent contributions, Variosystems reinforces its dedication to employee well-being. Together with the EPF, the ETF provides a comprehensive social security framework—balancing retirement savings with immediate welfare benefits—thus assuring employees of both future stability and present support.

#### 1.4.4 Recruitment Procedures

Recruitment at Variosystems is carried out in a systematic, transparent, and merit-based manner, ensuring equal opportunity and fairness to all applicants. The process is designed to place the right candidate in the right position, support internal career progression, and uphold the organization's values. The following steps outline the recruitment procedure:

- Approval of Vacancy
  - When a vacancy arises, the respective sectional head notifies the HR Department after confirmation from the Executive Leadership Team (ELT).
  - The HR Manager verifies if the vacancy falls within the manpower budget and determines whether it requires external advertising.
- Initiation of Requirement
  - The direct supervisor completes the Recruitment Requisition and Job Analysis Form, which is verified by the departmental manager.
  - This step can also be initiated through the company intranet to streamline the process.

- Advertising the Vacancy
  - Internal Channels: Company intranet, notice boards, and internal circulars.
  - External Channels: Job portals (e.g., Top Jobs), newspapers, social media platforms, and recruitment agencies.
  - Priority is always given to internal candidates where possible, encouraging career development within the organization.
- Application Review & Shortlisting
  - Applications are screened based on predefined qualifications and work experience.
  - For senior layers (L1–L8), the requirements are based on detailed job descriptions.
  - For entry-level layers (L9–L11), the minimum qualification is G.C.E. O/L with relevant experience.
  - Canvassing is strictly prohibited and treated as grounds for disqualification.
- Interviewing
  - Shortlisted candidates attend structured interviews conducted by a panel comprising cross-functional heads and HR representatives.
  - Evaluation focuses on technical competence, behavioral suitability, and growth potential.
  - For middle-management roles, psychometric assessments may also be conducted.

- Reference and Background Checks
  - HR verifies previous employment records, character references, and relevant professional skills.
  - Depending on the role, candidates may undergo medical examinations from company-approved practitioners.
  - In certain cases, a police clearance report is also requested for additional verification.
- Issuing the Appointment Letter
  - Selected candidates receive a formal appointment letter, which must be signed and returned within one week.
  - Candidates must also submit essential documents such as proof of identity, birth certificate, academic qualifications, and other relevant certificates.
- Induction and Onboarding
  - New recruits undergo a comprehensive induction program within the first two weeks of joining.
  - The program introduces them to company policies, culture, and departmental operations.
  - A New Employee Training Plan is provided, along with department-specific training sessions.

- Special Considerations
  - Internal applicants are required to go through HR, and promotions are subject to a three-month probationary period.
  - Variosystems maintains a strong policy of equal opportunity employment, with no discrimination based on gender, race, or religion, while actively supporting the inclusion of persons with disabilities.

#### 1.4.5 Compensation

The company follows an industry-standard compensation structure based on grade levels and job roles. Salaries are paid on a monthly basis and are reviewed periodically. Salary increments are performance-based and aligned with the company's financial capacity and market conditions. In addition, statutory benefits such as EPF and ETF contributions are included in the compensation package.

#### 1.4.6 Welfare Activities

Variosystems places strong emphasis on the welfare and empowerment of its employees, recognizing that organizational success is directly tied to the well-being, motivation, and growth of its workforce. During my training, I observed that the company has implemented a wide range of welfare activities aimed at ensuring financial security, health and safety, career development, and work-life balance for all staff members.

## 1. Financial Welfare

- Employees are covered under the Employees' Provident Fund (EPF) and the Employees' Trust Fund (ETF) as per statutory requirements, ensuring retirement savings and additional financial security.
- Comprehensive insurance schemes—including life, accident, funeral, and medical coverage—are provided to safeguard employees during emergencies.
- Welfare Loan Scheme: Employees may obtain financial assistance with approval from the Welfare Committee.
- Service appreciation awards for long-serving employees: gold coins, souvenirs, and hotel packages for milestones of 10, 15, 20, 25, and 30 years of continuous service.

## 2. Compensation and Benefits

- Competitive salary packages complemented by allowances for:
  - Transport
  - Fuel
  - Mobile usage
  - Shift duties
- Attendance and production-based incentives to encourage discipline and productivity.
- Additional benefits: Sinhala and Tamil New Year festival allowance, Annual bonus (subject to management approval)

## 3. Health and Safety

- On-site first aid facilities staffed with trained personnel.
- Provision of Personal Protective Equipment (PPE), including gloves, masks, goggles, and ESD jackets.
- Regular safety drills, including fire drills.

- Ergonomic and hazard-free workplace design to reduce fatigue and minimize occupational risks.

#### 4. Additional Welfare Facilities

- Subsidized cafeteria for affordable and nutritious meals.
- Transportation services for commuting convenience.
- Uniforms and RFID-based identity cards for safety and operational efficiency.
- Lodging facilities made available when required.

#### 5. Employee Empowerment Programs

- Structured induction programs for new employees.
- Continuous learning supported through:
  - Regular technical training
  - Soft skills development
  - Leadership workshops
  - Educational support schemes, including reimbursement of up to 80% of tuition fees for further studies
- Post-training evaluations to ensure effectiveness and support career advancement.
- Transparent career progression through:
  - Internal recruitment opportunities
  - Succession planning initiatives to prepare employees for leadership roles

#### 6. Employee Participation and Recognition

- Encouragement of staff contribution through:
  - Feedback surveys
  - Suggestion mechanisms
  - Participation in committees for company events

- Performance appraisals identify achievements, rewarded through:
  - Bonuses
  - Incentives
  - Recognition programs
- Participatory approach fosters a sense of ownership and accountability.

## 7. Work-Life Balance and Organizational Culture

- Recreational activities, sports events, social gatherings, and annual company trips for relaxation and stress relief.
- Reinforcement of teamwork and morale through social engagement.
- Emphasis on values of integrity, courage, and responsibility.
- Transparent communication channels promoting openness and trust between staff and management.

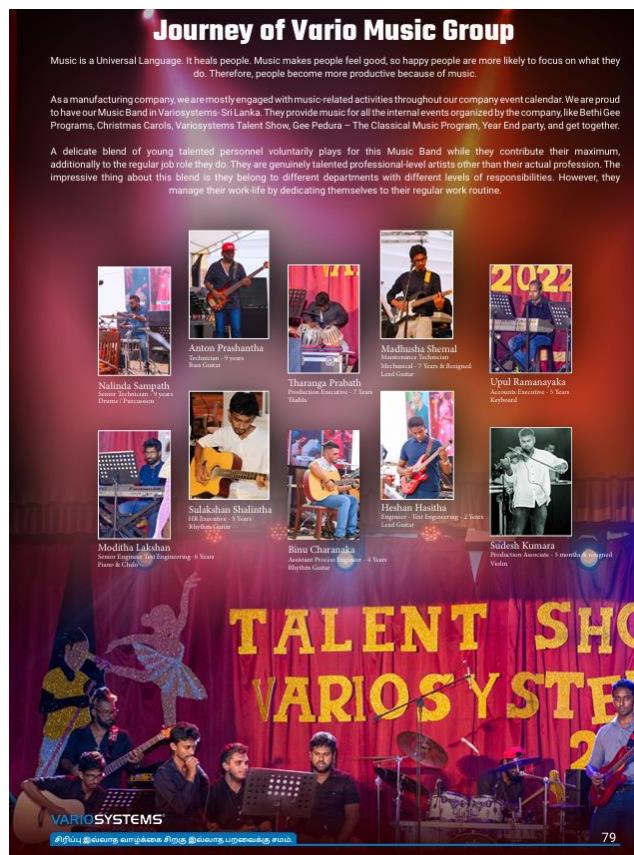


Fig.7: Variosystems Music Events

#### **1.4.7 Safety Measures**

The company enforces strict Health, Safety, and Environment (HSE) policies to maintain a safe working environment. Employees are provided with personal protective equipment (PPE) and participate in regular safety awareness programs and emergency drills. A dedicated safety committee monitors compliance with workplace safety standards and ensures continuous improvement in occupational safety practices.

#### **1.4.8 Training and Development Strategies**

Training and development are integral to the company's growth strategy. Programs are designed to enhance both technical competencies and soft skills of employees. The company provides on-the-job training, external training programs, and leadership development opportunities. Training needs are identified through performance appraisals and succession planning, ensuring that employees are equipped to meet present and future organizational demands.

#### **1.4.9 Standards Followed by the Company**

Variosystems (Pvt) Ltd follows internationally recognized standards to ensure quality, environmental responsibility, occupational health and safety, and compliance with medical device regulations. These standards strengthen customer trust, enhance operational efficiency, and ensure continuous improvement across all organizational levels.

##### **1. ISO 9001:2015 – Quality Management System (QMS)**

This standard specifies requirements for a Quality Management System. It enables the organization to consistently deliver products and services that meet customer and regulatory requirements, while promoting continuous improvement.

Benefits:

- Helps address organizational risks and opportunities in a structured manner.
- Ensures customer requirements are met.
- Increases revenue and attracts new customers.
- Improves company and product quality.
- Enhances customer satisfaction.
- Documents, understands, and communicates company processes.
- Develops a professional culture and improves employee morale.
- Increases operational consistency and efficiency.
- Reduces waste and costs.
- Achieves international quality recognition.

General Requirements:

- Customer Focus
- Leadership
- Engagement of People
- Process Approach
- Continuous Improvement
- Evidence-based Decision Making
- Relationship Management

2. ISO 14001:2015 – Environmental Management System (EMS)

This standard sets requirements for an Environmental Management System, helping organizations minimize negative environmental impacts, comply with regulations, and build stakeholder trust.

**Benefits:**

- Protects the environment by preventing or reducing adverse impacts.
- Improves overall environmental performance.
- Meets customer expectations in global markets.
- Enhances workplace environment and safety.
- Strengthens relationships with communities, regulators, and stakeholders.
- Integrates environmental responsibility into business strategy.

**Important Requirements:**

- Environmental Aspects & Impacts Procedure
- Evaluation of Compliance Procedure
- Emergency Preparedness & Response Procedure
- Performance Monitoring Procedure

**Key Practices:**

- Annual audits of processes and equipment by the Environmental Team.
- Monitoring daily raw material consumption and waste output.
- Ensuring legal compliance in disposal practices.
- Categorizing risks as High, Medium, or Low and applying corrective actions (short-term, mid-term, annual).
- Emergency preparedness through hazard identification, response planning, equipment maintenance, and staff training.
- Monitoring key performance indicators such as waste reduction, energy efficiency, recycling rates, and community feedback.

**General Requirements:**

- Scope of EMS
- Environmental Policy

- Evaluation of Environmental Risks & Opportunities
- Evaluation of Environmental Aspects
- Environmental Objectives & Plans for Achieving Them
- Operational Control Procedures

### 3. ISO 45001:2018 – Occupational Health & Safety (OH&S) Management System

ISO 45001 provides a framework for managing workplace safety, preventing occupational risks, and ensuring the well-being of employees.

Benefits:

- Improves occupational health and safety performance.
- Prevents workplace hazards and accidents.
- Reduces liability and costs associated with incidents.
- Promotes a healthier workforce by preventing illness before it occurs.
- Enhances public image and customer trust.
- Strengthens competitive advantage.
- Provides better access to capital through improved compliance and risk control.

### 4. ISO 13485:2016 – Quality Management for Medical Devices

This standard is designed for medical device manufacturers and suppliers, ensuring compliance with regulatory and safety requirements throughout the product lifecycle.

Benefits:

- Ensures the safety and reliability of medical devices.
- Provides compliance with international regulations.
- Covers all stages from design to disposal.
- Supports risk management and traceability in production.

## General Requirements:

- Corrective & Preventive Action (CAPA) Management
- Documentation of Risk Management in Product Realization
- Monitoring, Testing, and Traceability of products

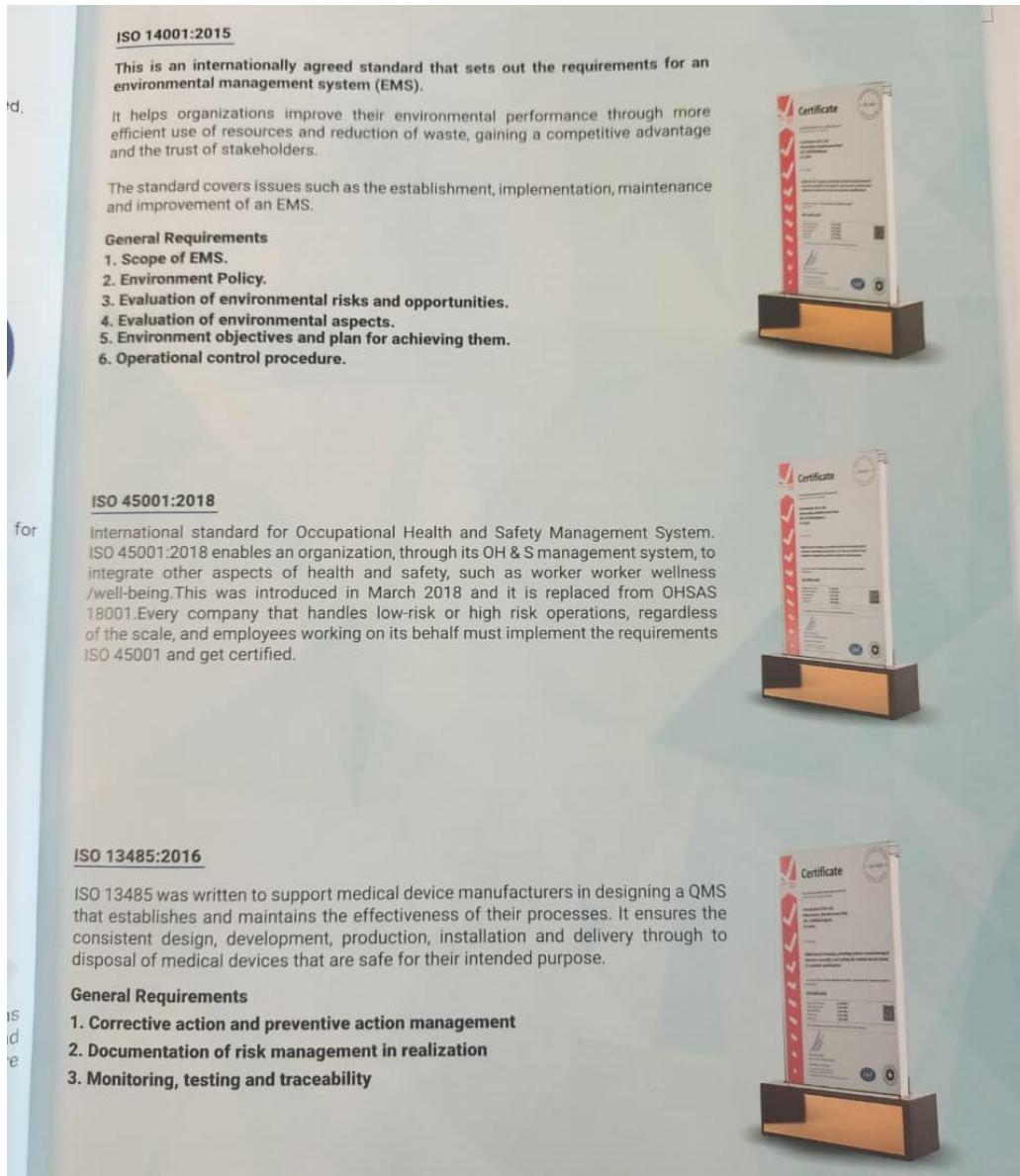


Fig.8: Certificates received for the standards followed

## 1.5 Safety practices

Variosystems places the highest priority on health and safety, considering it an essential foundation for protecting employees, safeguarding the environment, and ensuring long-term business sustainability. The company aligns its practices with ISO 45001 Occupational Health and Safety Management Systems and the ILO Guidelines on Occupational Safety and Health, ensuring that its approach meets both international best practices and local legal requirements.

A safe workplace not only reduces the risk of injuries and illnesses but also contributes to product quality, operational efficiency, and employee morale. The following comprehensive measures are in place to embed safety across all operations:

### 1.5.1 Hazard Identification and Control

Workplace hazards are systematically identified, documented, and controlled to reduce risks. This covers chemical, biological, physical, ergonomic, and mechanical risks.

- Engineering Controls: The first line of defense involves designing hazards out of processes. For example, machinery is equipped with fixed guards, automatic interlocks, and physical barriers to prevent contact with moving parts. Ventilation systems are installed in production areas to minimize exposure to airborne chemicals.
- Administrative Controls: Safe work procedures, such as lockout/tagout during maintenance, shift rotation to reduce fatigue, and preventive maintenance schedules, are enforced. Regular audits and inspections ensure compliance.
- Personal Protective Equipment (PPE): Where hazards cannot be completely eliminated, PPE such as gloves, helmets, safety glasses, respirators, and protective clothing is provided. Workers are trained not just in wearing PPE but also in maintaining and storing it correctly.
- Industrial Hygiene Monitoring: Exposure levels to noise, dust, vapors, and other agents are measured periodically. Corrective measures—like noise dampening,

dust extraction, or substitution of hazardous substances—are implemented based on monitoring data.

- Ergonomics and Physical Strain: Tasks that involve manual handling, repetitive motion, or awkward postures are analyzed. Workstations are redesigned where possible, mechanical aids are provided, and lifting limits are defined to minimize musculoskeletal disorders.

### 1.5.2. Emergency Preparedness

Variosystems recognizes that unexpected incidents can never be fully eliminated; therefore, detailed preparedness systems are in place.

- Risk-Based Planning: Potential emergency scenarios—fires, explosions, chemical leaks, natural disasters—are identified and assessed through risk analysis.
- Emergency Infrastructure: Facilities are equipped with fire alarms, smoke detectors, sprinkler systems, chemical spill kits, and first-aid stations. Evacuation routes are clearly marked, illuminated, and kept free of obstruction at all times.
- Training and Drills: Employees undergo regular training on emergency procedures, including evacuation techniques, use of extinguishers, and assembly point management. Full-scale evacuation drills are conducted at planned intervals to ensure familiarity.
- Communication Systems: Multi-channel notification systems, including alarms, PA announcements, and digital alerts, ensure all employees can be reached quickly in an emergency.
- Recovery Planning: Beyond immediate response, recovery plans are prepared to minimize harm to life, property, and the environment. This includes business continuity planning, environmental protection measures, and structured return-to-work protocols following a major incident.

### 1.5.3. Occupational Injury and Illness Management

The company has a transparent and structured process for managing workplace injuries and illnesses.

- Reporting and Recording: Employees are encouraged to promptly report any unsafe condition, near miss, or incident without fear of retaliation. All cases are classified, recorded, and tracked.
- Medical Response: On-site first-aid facilities and trained personnel provide immediate treatment. In more serious cases, workers are referred to external medical care with full company support.
- Root Cause Investigations: Every incident triggers an investigation aimed at identifying the underlying causes, not just symptoms. Lessons learned are shared across teams to prevent recurrence.
- Corrective and Preventive Actions: Measures are implemented to address both immediate hazards and systemic gaps. These actions are monitored for effectiveness.
- Rehabilitation and Reintegration: Injured workers are supported with medical leave, rehabilitation programs, and modified duties as needed, ensuring safe and dignified reintegration into the workforce.

### 1.5.4. Machinery and Workplace Safety

Production and support equipment are designed, installed, and maintained with worker safety in mind.

- Safeguarding: Machinery is fitted with guards, interlocks, and emergency stop devices. Where appropriate, automation reduces the need for manual intervention in hazardous areas.
- Inspection and Maintenance: Preventive maintenance programs ensure machines remain safe and reliable. Inspections are documented and corrective measures are prioritized for high-risk findings.

- Safe Facilities: Employees have access to clean and hygienic sanitation facilities, potable drinking water, and sanitary food preparation and dining areas.
- Housing Standards: In cases where worker housing is provided, dormitories are kept safe, clean, and well-ventilated. Features include adequate lighting, bathing facilities, emergency exits, secure storage for personal belongings, and reasonable personal space.

#### 1.5.5. Health and Safety Communication and Training

Safety is only effective if employees are fully aware of risks and confident in managing them.

- Information Sharing: Health and safety policies, procedures, and hazard warnings are displayed prominently in the workplace, using signage and labels that are clear and multilingual.
- Training Programs: Comprehensive safety training is provided before employees begin work and is reinforced through regular refresher courses. Specialized training is offered for high-risk roles, such as electrical maintenance or chemical handling.
- Worker Involvement: Employees are encouraged to raise safety concerns, suggest improvements, and participate in joint safety committees. This culture of openness ensures continuous improvement.
- Accessibility: All training and communication are delivered in languages understood by employees, recognizing the diversity of the workforce.



Fig.9: wire harnesses

# **Chapter 2 - Training Experience at the Institute**

## **2.1 Overview of the Training Program**

### **2.1.1 Training Location and Supervision**

The training took place at Vario Systems (Pvt) Ltd, Nelumwatta, Kotadeniyawa Road, Badalgama, with additional exposure to the IT division at the 23rd Floor, East Tower, World Trade Center. My supervisor, Mr. T. Roshan Prasanna Perera, provided continuous guidance and evaluation, ensuring that I progressed effectively through the program. The work environment was professional and collaborative, offering firsthand exposure to corporate-level IT operations.

### **2.1.2 General Schedule**

The training period ran from 17 February 2025 to 04 August 2025. The schedule combined guided learning, projects, and self-study. Early weeks focused on mastering new technologies, while later phases emphasized practical project development, including CRUD applications, a Meal Management System, and intranet tools such as the Shopfloor, CustomerList, and Traffic Monitoring Dashboards.

The daily routine followed an agile framework:

- Daily meetings every morning at 9:00 AM to review progress.
- Sprint opening each Tuesday to plan new tasks on JIRA.
- Sprint closing each Friday to review and complete deliverables.

This structure provided consistent exposure to agile practices while reinforcing teamwork and accountability.

## 2.2 My creations.

### 2.2.1 Contributed projects

During the internship, I had the opportunity to contribute to several projects that strengthened both my technical and problem-solving skills. Each project followed a structured development process, where I applied theoretical knowledge from my academic background to real-world industrial practices.

#### 1. Blazor CRUD Applications

- I began with the fundamentals of Blazor, learning about rendering modes such as SSR (Server-Side Rendering), WASM (WebAssembly), and Auto (Hybrid).
- I practiced creating CRUD applications using these different rendering modes. The projects included database connectivity with Entity Framework Core, validation using Data Annotations, and form handling with Blazor's EditForm component.
- These projects helped me understand the differences between DbContext and IdentityDbContext, and how DTOs and Service Layers improve application structure.

#### 2. Meal Management Application

- This was the main collaborative project during my training. Initially developed in auto-rendering mode, the project faced issues such as non-functional buttons and server errors. After restructuring, it was implemented as a Blazor WASM project with separate Client and Server sides.
- I contributed to developing core features such as pagination, search, and validation.
- DTOs were created for secure data transfer between frontend and backend. The project also applied the Service Pattern and Repository Pattern for better abstraction.
- Technologies used: Blazor, Tailwind CSS, EF Core, ASP.NET API.
- Challenges faced included a 500 Internal Server Error, which I solved by correctly registering dependencies in Program.cs.



**Meal Management System - Revision 001**

**Select Date Range:**

From: 01/13/2024 To: 06/13/2025

**Select Meal Type:**

BreakFast, Tea Time

All

Tea Time

BreakFast

Lunch

Dinner

**Meal Management Table**

| Created Date Time  | RFID  | Station ID |
|--------------------|-------|------------|
| 05/05/2025 5:18 PM | 12352 |            |
| 05/05/2025 4:49 PM | 2935  |            |
| 07/08/2024 8:47 AM | 58150 |            |
| 07/08/2024 8:39 AM | 64329 | ST01       |
| 07/08/2024 8:01 AM | 63563 | ST01       |
| 04/03/2024 8:27 AM | 64528 | ST01       |
| 04/03/2024 8:27 AM | 64527 | ST01       |
| 04/03/2024 8:27 AM | 64526 | ST01       |
| 04/03/2024 8:27 AM | 64525 | ST01       |
| 04/03/2024 8:27 AM | 64524 | ST01       |
| 04/03/2024 8:26 AM | 64532 | ST01       |
| 04/03/2024 8:26 AM | 64531 | ST01       |
| 04/03/2024 8:26 AM | 64530 | ST01       |
| 04/03/2024 8:26 AM | 64529 | ST01       |
| 04/03/2024 8:25 AM | 64329 | ST01       |

[Navigation icons] Page 1 of 1 [Navigation icons]

Fig.10: Meal Management WebApp

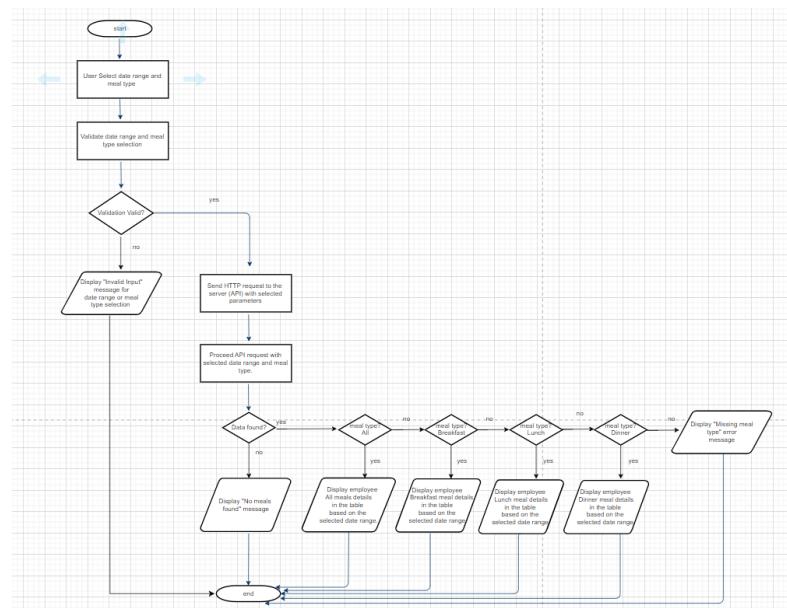


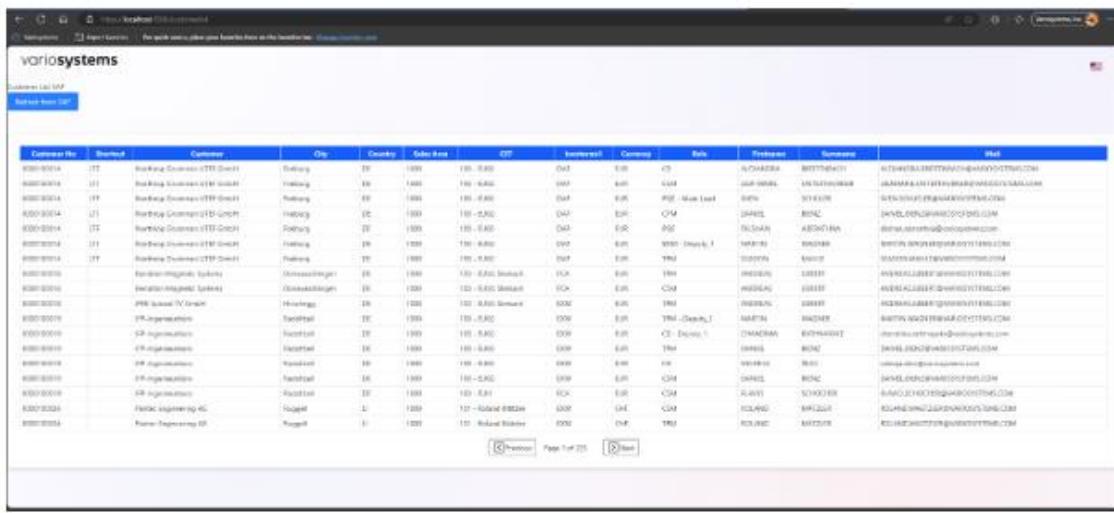
Fig.11: Meal Management WebApp-Flow Diagram

### 3. Employee Management System (Individual Project)

- As a self-study exercise, I built a small Blazor WASM application integrated with APIs to manage employee data.
- This project helped me independently apply the concepts of services, controllers, DTOs, and database interactions.

### 4. CustomerList Tool

- This project aimed to redesign an existing intranet sales tool by integrating SAP API data with caching and database storage.
- Initially, a 500-error appeared due to data not being properly stored. After debugging, I fixed the issue by restructuring services and controllers, introducing a refresh endpoint to fetch data from SAP APIs and store it locally.
- Pagination was also implemented to optimize large dataset loading.



The screenshot shows a web browser displaying a table of customer data. The table has columns for Customer No., Name, Customer, City, Country, Sales Area, CDP, Inventory, Currency, Rate, Residence, Name, and Mail. The data includes various entries such as 'Buchungskonten (ITB) GmbH' in Berlin, Germany, and 'Buchungskonten (ITB) GmbH' in Hamburg, Germany. The table is paginated at the bottom with 'Page 1 of 255' and 'Next'.

| Customer No. | Name | Customer                  | City     | Country | Sales Area | CDP        | Inventory | Currency | Rate | Residence       | Name        | Mail        |
|--------------|------|---------------------------|----------|---------|------------|------------|-----------|----------|------|-----------------|-------------|-------------|
| 000000001    | ITC  | Buchungskonten (ITB) GmbH | Berlin   | DE      | 1000       | 100 - 0000 | 000       | EUR      | 100  | ITC             | ITC@ITC.COM | ITC@ITC.COM |
| 000000002    | ITI  | Buchungskonten (ITB) GmbH | Hamburg  | DE      | 1000       | 100 - 0000 | 000       | EUR      | 100  | ITI             | ITI@ITI.COM | ITI@ITI.COM |
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| 000000075    | ITE  | Buchungskonten (ITB) GmbH | Hamburg  | DE      | 1000       | 100 - 0000 | 000       | EUR      | 100  | ITE             | ITE@ITE.COM | ITE@ITE.COM |
| 000000076    | ITF  | Buchungskonten (ITB) GmbH | Hamburg  | DE      | 1000       | 100 - 0000 | 000       | EUR      | 100  | ITF             | ITF@ITF.COM | ITF@ITF.COM |
| 000000077    | ITL  | Buchungskonten (ITB) GmbH | Hamburg  | DE      | 1000       | 100 - 0000 | 000       | EUR      | 100  | ITL             | ITL@ITL.COM | ITL@ITL.COM |
| 000000078    | ITV  | Buchungskonten (ITB) GmbH | Hamburg  | DE      | 1000       | 100 - 0000 | 000       | EUR      | 100  | ITV             | ITV@ITV.COM | ITV@ITV.COM |
| 000000079    | ITW  | Buchungskonten (ITB) GmbH | Hamburg  | DE      | 1000       | 100 - 0000 | 000       | EUR      | 100  | ITW             | ITW@ITW.COM | ITW@ITW.COM |
| 000000080    | ITX  | Buchungskonten (ITB) GmbH | Hamburg  | DE      | 1000       | 100 - 0000 | 000       | EUR      | 100  | ITX             | ITX@ITX.COM | ITX@ITX.COM |
| 000000081    | ITY  | Buchungskonten (ITB) GmbH | Hamburg  | DE      | 1000       | 100 - 0000 | 000       | EUR      | 100  | ITY             | ITY@ITY.COM | ITY@ITY.COM |
| 000000082    | ITZ  | Buchungskonten (ITB) GmbH | Hamburg  | DE      | 1000       | 100 - 0000 | 000       | EUR      | 100  | ITZ             | ITZ@ITZ.COM | ITZ@ITZ.COM |
| 000000083    | ITB  | Buchungskonten (ITB) GmbH | Hamburg  | DE      | 1000       | 100 - 0000 | 000       | EUR      | 100  | ITB             | ITB@ITB.COM | ITB@ITB.COM |
| 000000084    | ITD  | Buchungskonten (ITB) GmbH | Hamburg  | DE      | 1000       | 100 - 0000 | 000       | EUR      | 100  | ITD             | ITD@ITD.COM | ITD@ITD.COM |
| 000000085    | ITE  | Buchungskonten (ITB       |          |         |            |            |           |          |      |                 |             |             |

I contributed to adding pagination, virtualization, filtering, mobile responsiveness, and Power BI chart integration. These optimizations reduced loading time and improved user experience.

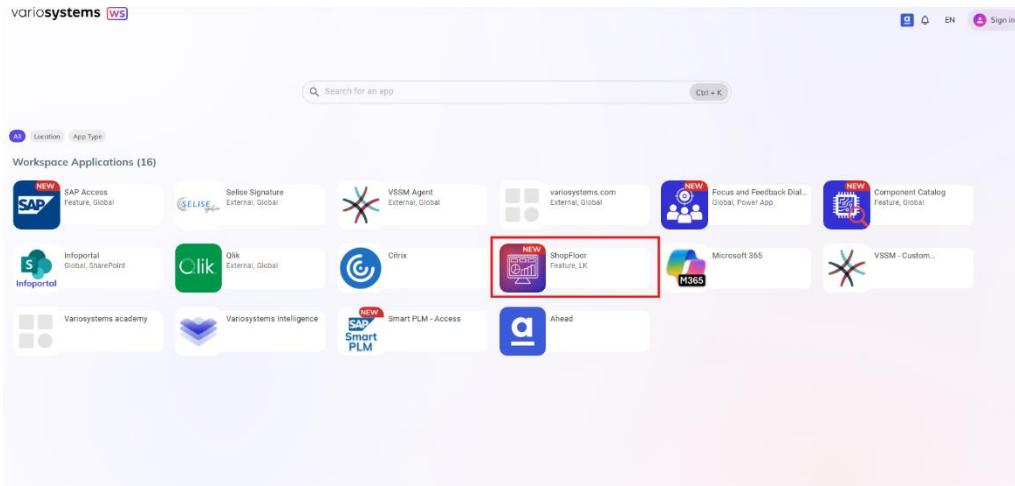


Fig.13: Shopfloor – Live Launch Web App

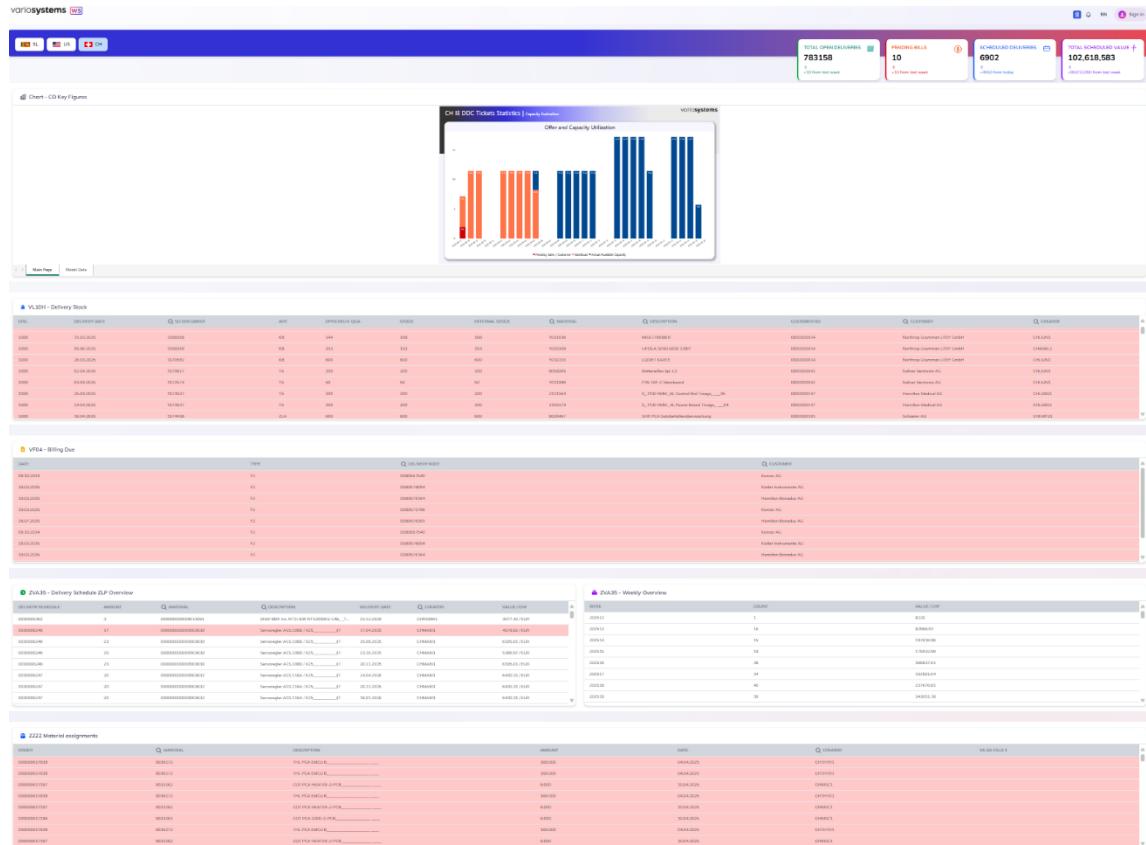


Fig.14: Shopfloor Web App

## 6. Logistic Tool Documentation

- I documented the logic for the company's Logistic Tool, which manages import/export details.
- I wrote detailed logic for pagination, shipment handling, and editing modules. This helped me understand the backend workflow and how business processes are converted into software logic.

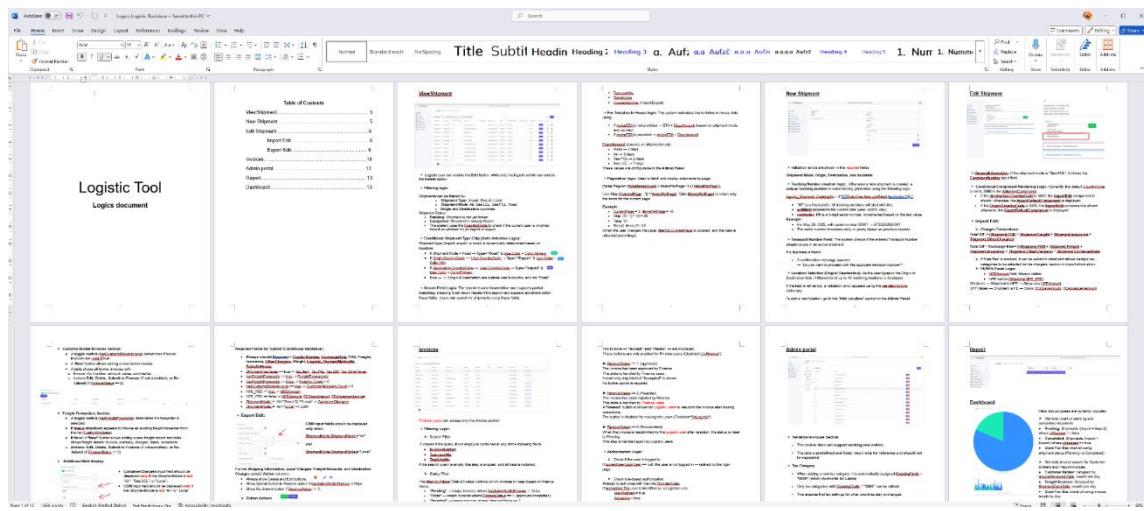


Fig.15: Logistic Tool logics Documentation

## 7. Traffic Monitoring Dashboard

- A new intranet tool developed to monitor traffic trends across platforms (intranet, workspace, Vario-workspace).
- I contributed to the UI design, caching strategy, and integrating charts to visualize user activity.
- The tool provided statistics such as active users, most visited pages, and country-wise breakdowns

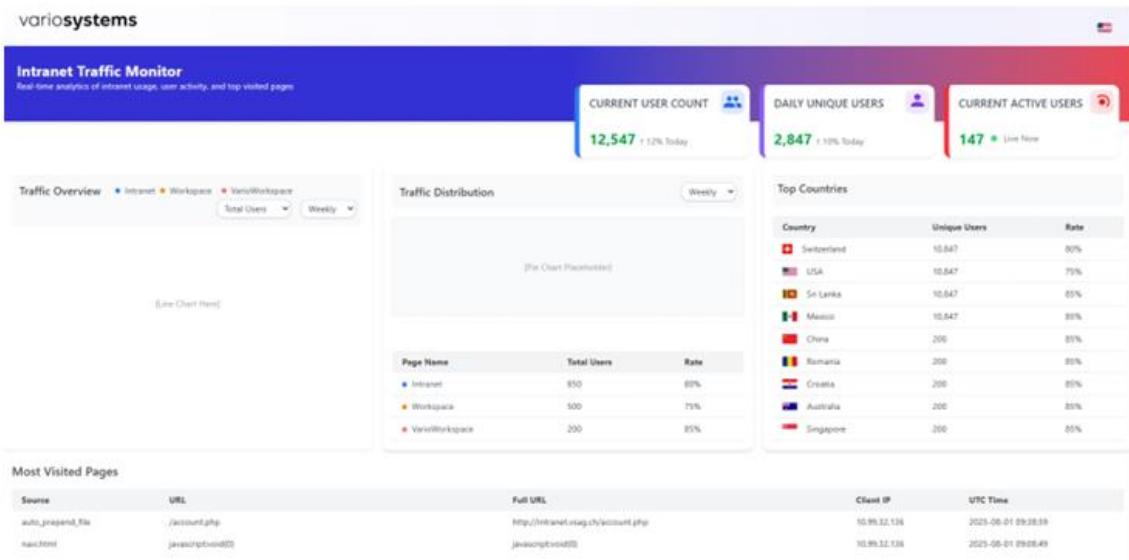


Fig.16: Traffic Monitoring Dashboard

## 8. Production Efficiency Tool

- This is one of the internal tools developed to monitor efficiency factors such as overall efficiency, production audit ratio, and 5S factors of each employee and organizational unit in the company. I was assigned to develop this production efficiency tool by designing its ER diagram on my own.

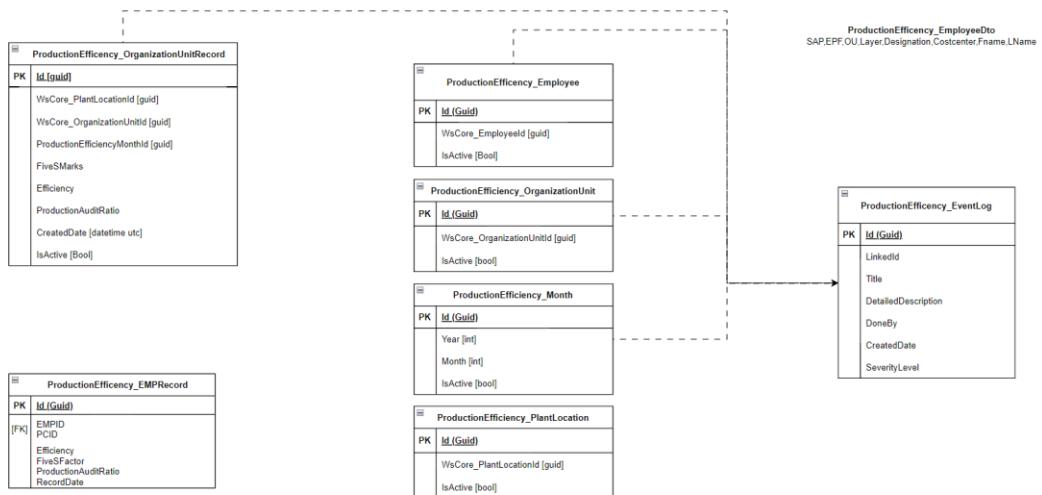


Fig.17: ER Diagram for the Production Efficiency Tool

## 2.2.2 Followed formats and procedures.

While developing these projects, I adhered to the company's standard development practices and followed a structured architecture that was applied consistently across all tools. This ensured that projects remained scalable, maintainable, and easy for multiple developers to collaborate on.

### Use of APIs

All backend systems were developed using ASP.NET Core Web APIs. These APIs exposed structured endpoints for CRUD operations, validations, and data transfer. On the client side, Blazor WebAssembly consumed these APIs through dedicated client services. To ensure secure and efficient communication, DTOs (Data Transfer Objects) were used to decouple database entities from client-side models.

### Architecture Adopted

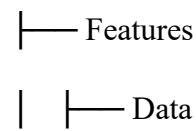
The overall architecture included the following layers:

- Workspace → Core business features (entities, services, endpoints).
- Workspace.Api → API gateway layer exposing services to clients.
- Workspace.Client → Blazor WASM frontend application.
- Workspace.UI → Shared presentation layer (layouts, themes, reusable UI).
- Workspace.Test → Testing layer, containing client- and service-level test implementations.

This architecture promoted modularity, reusability, testability, and maintainability, while also ensuring that teams could work in parallel on different layers.

### Common Folder Structure

Workspace



```
|   └── [FeatureName]  
|   |   └── Endpoints/ # API endpoints (Controllers)  
|   |   └── Entities/ # Business/domain entities  
|   |   └── Services/ # Business logic and core services
```

## Workspace.Api

```
└── Features  
    └── [FeatureName]  
        └── EndPoints/ # API controllers exposed to external clients  
        └── Data/ # EF Core DbContext, repositories, migrations  
        └── Program.cs # Startup configuration  
        └── appsettings.json      # API settings and database connection
```

## Workspace.Client

```
└── Features  
    └── [FeatureName]  
        └── Components/ # Blazor UI components  
        └── DTOs/ # Data Transfer Objects for API communication  
        └── Services/ # Client-side API call services
```

## Workspace.Test

```
└── Client  
└── Workspace  
    └── WorkspaceClient
```

## Workspace.Ui

```
|—— Shared/ # Shared layouts and components  
|—— Theme/ # UI styling (Tailwind, MudBlazor, etc.)  
└—— Pages/ # High-level application pages
```

## Roles of Each Layer

### Workspace (Core Layer)

- Contains Entities that represent database models.
- Defines Services that implement the core business rules.
- Includes Endpoints (controllers) that connect business logic to APIs.

### Workspace.Api (API Layer)

- Provides RESTful APIs for CRUD operations and system integrations.
- Configures middleware, dependency injection, and authentication.
- Acts as the gateway between the database and the client.

### Workspace.Client (Frontend Layer)

- Built using Blazor WASM.
- Implement UI components for user interaction.
- Uses DTOs and Client Services to securely call backend APIs.

### Workspace.UI (Presentation Layer)

- Maintains global layouts, navigation bars, themes, and reusable UI elements.
- Provides consistency across multiple applications/tools.

### Workspace.Test (Testing Layer)

- Provides unit tests for Workspace services and entities.
- Includes integration tests for verifying API responses.
- Contains end-to-end (E2E) tests for Workspace.Client to ensure correct interaction between client and backend.
- Helps maintain code quality, reliability, and regression testing

### 2.2.3 Tools / Technologies / Framework

During my training, I was able to work with a wide range of technologies, tools, and frameworks. Each of them contributed to my technical skill development and professional growth in different ways. The following is a detailed explanation of each:

#### 1. Blazor

Blazor is a web framework developed by Microsoft that allows building interactive web applications using C# and .NET, instead of relying solely on JavaScript. It supports both Blazor Server and Blazor WebAssembly (WASM) models.

During training, I practiced creating components, routing, data binding, form validation, and CRUD operations. I also explored rendering modes (SSR, WASM, Auto) and learned when to choose each based on project requirements. This framework helped me understand how frontend and backend can be integrated seamlessly with .NET technologies.

```
@page "/counter"

<PageTitle>Counter</PageTitle>

<h1>Counter</h1>
<p role="status">Current count: @currentCount</p>
<button class="btn btn-primary" @onclick="IncrementCount">Click me</button>

@code {
    private int currentCount = 0;

    private void IncrementCount()
    {
        currentCount++;
    }
}
```

The diagram illustrates the structure of a Blazor component. It is divided into three main sections:

- Directive section:** Contains the directive `@page "/counter"`. This section is highlighted in light blue.
- UI section:** Contains the UI code, including the title, heading, status message, and button. This section is highlighted in light green.
- Code section:** Contains the C# code for the component's logic, specifically the `@code` block which defines a private variable `currentCount` and a method `IncrementCount`. This section is highlighted in light orange.

Fig. 18: Structure of Blazor Component

Table 1: Comparison between Blazor and React

| Feature / Aspect      | Blazor                      | React  |
|-----------------------|-----------------------------|--|
| Developed By          | Microsoft                   | Facebook   |
| Language              | C#                          | JavaScript   |
| Ecosystem             | .NET ecosystem              | JavaScript ecosystem                                 |
| UI Rendering          | Server-side and client-side | Client-side  |
| Data Binding          | Two-way data binding        | One-way data binding                                 |
| Templating            | Razor syntax                | Jsx  |
| Performance           | Good                        | Excellent  |
| Server-Side Rendering | Possible with Blazor server | Possible with Next.js or other server-side solutions |

Table 2: Differences between the rendering modes

| Feature            | Blazor Server       | Blazor WebAssembly (WASM)      | Blazor SSR (Server-Side Rendering)  | Blazor Auto (Hybrid)               |
|--------------------|---------------------|--------------------------------|-------------------------------------|------------------------------------|
| Rendering Location | Server              | Client (Browser)               | Initially Server, then Client       | Auto-selects based on platform     |
| Initial Load       | Fast                | Slow (due to WebAssembly)      | Fast (server-rendered)              | Optimized for platform             |
| Interactivity      | Depends on SignalR  | Full client-side interactivity | Hybrid (Server + Client)            | Adapts to platform                 |
| Network Dependency | Constant Connection | No ongoing connection needed   | Server-dependent for initial render | Auto-switches based on environment |
| SEO Friendly       | No                  | Limited                        | Yes                                 | Depends on the platform            |

## 2. Tailwind CSS

Tailwind CSS is a utility-first CSS framework that allows rapid UI development by using predefined classes. Instead of writing long custom CSS files, developers can directly apply Tailwind classes to HTML elements, making the design process faster and more consistent.

In my projects, Tailwind was particularly useful for creating responsive layouts, typography, spacing, and color schemes. I also learned how to integrate Tailwind into Blazor applications, which gave me hands-on experience in modern styling practices widely used in industry.

## 3. MudBlazor

MudBlazor is a Blazor component library based on Material Design principles. It provides pre-built components like buttons, dialogs, navigation menus, data tables, and charts.

Although I initially faced challenges integrating MudBlazor, I learned how to install the required packages, configure them in 'Program.cs', and import styles/scripts into 'wwwroot/index.html'. Using MudBlazor improved my ability to create professional-looking UIs without writing everything from scratch.

## 4. Entity Framework (EF) Core

Entity Framework Core is an Object-Relational Mapper (ORM) for .NET, which allows developers to interact with databases using C# objects instead of raw SQL queries.

I practiced creating DbContext classes, migrations, and CRUD operations. For example, in the Meal Management App, I used EF Core to define the EmployeeMeal entity, set up the database schema, and query/filter data. EF Core simplified database interactions and demonstrated the benefits of using an ORM for maintainability and productivity.

## 5. Microsoft Azure

Azure is Microsoft's cloud computing platform, offering services like hosting, storage, and identity management. I explored the Azure Fundamentals course, where I learned about different service models (IaaS, PaaS, SaaS) and deployment types (public, private, hybrid, multi-cloud).

This knowledge highlighted the importance of cloud scalability, availability, and security. It also showed me how applications like Blazor web apps can be deployed and scaled efficiently on Azure.

## 6. Visual Studio

Visual Studio was the primary IDE used during training. It provided integrated tools for coding, debugging, Git version control, package management, and testing.

Through Visual Studio, I was able to set up projects, configure NuGet packages (such as EF Core and MudBlazor), and debug both client-side and server-side code effectively. This IDE played a crucial role in my ability to build structured and error-free applications.

## 7. Jira

Jira is an agile project management tool used for tracking tasks, sprints, and issues. At the organization, Jira was used to assign development tasks, track progress, and manage workflows.

Using Jira taught me how professional teams collaborate in Agile environments. It also improved my ability to plan, prioritize, and deliver tasks within deadlines while maintaining clear communication with supervisors and teammates.

## 8. Draw\io

Draw\io is a web-based diagramming tool used for creating flowcharts, system diagrams, and architecture diagrams. I used it to design project flow diagrams, entity-relationship diagrams, and clean architecture models.

This tool helped me improve my visual representation of systems, making it easier to explain project structures to supervisors and peers.

## 9. Power BI

Power BI is a business intelligence and data visualization tool. Although my usage was limited, I explored how it can be used to transform raw data into interactive dashboards and reports.

Learning Power BI gave me an understanding of how data analytics is applied in industry to support decision-making and reporting.

## 10. SQL Server

SQL Server was the database management system used during the projects. It provided reliable data storage for applications such as the Meal Management App.

I practiced writing queries, creating schemas, and linking EF Core with SQL Server to manage data. SQL Server also exposed me to concepts like connection strings, migrations, and database security practices

## 2.3 Problem Analysis and Solutions.

### 2.3.1 Problem-solving skills

Problem-solving formed a central part of my training experience. The dynamic nature of industrial projects meant that new issues frequently emerged during different phases of development, and addressing them required a combination of technical knowledge, analytical reasoning, and adaptability.

Throughout my training, I cultivated a structured approach to problem-solving. I learned to begin with systematic analysis, where I identified the root cause of issues by breaking them into smaller, manageable components. This was followed by research and validation, where I referred to reliable sources such as Microsoft's official documentation, Blazor School, and Patrick God's YouTube tutorials, along with peer discussions, to evaluate potential solutions. I also embraced iterative experimentation, testing multiple approaches and comparing outcomes until I identified the most effective and sustainable resolution.

In addition, I strengthened my debugging practices, which involved analyzing error logs, tracing data flows, reviewing dependency configurations, and using step-by-step testing to validate system behavior. This systematic debugging process helped me develop confidence in resolving both front-end and back-end inconsistencies within tight deadlines.

Another important skill I developed was the ability to make architecture-aware decisions. By evaluating trade-offs such as performance, scalability, and maintainability, I learned how to select and apply appropriate strategies depending on project requirements. This enhanced my ability to think beyond immediate fixes and focus on long-term system reliability.

Through these practices, I significantly improved my logical reasoning, independent research capabilities, and technical resilience. More importantly, I developed the mindset to approach unfamiliar problems with patience and adaptability. These skills bridged the gap between academic knowledge and industrial practice, preparing me to contribute effectively in professional software development environments.

### 2.3.2 Challenges Faced and Solutions Implemented

During the course of my training, I encountered several practical challenges that required both technical and analytical solutions. These challenges provided me with valuable opportunities to apply structured problem-solving strategies in real-world development environments.

One of the earliest challenges was the adaptation to new technologies. At the beginning of my projects, the transition from academic programming practices to frameworks such as Blazor, Tailwind CSS, and MudBlazor proved demanding. The component-based structure, event lifecycles, and UI styling approaches were initially unfamiliar, which slowed my progress. Over time, through consistent practice and structured learning, I was able to overcome this barrier and implement functional applications effectively. This challenge taught me the importance of adaptability and persistence when approaching unfamiliar technical domains.

Another significant challenge arose when working with Blazor rendering modes and application structures. While the theoretical differences between Server, WebAssembly (WASM), Server-Side Rendering (SSR), and Auto (Hybrid) were clear, implementing them in real-world scenarios created performance and usability issues. For example, incorrect selection of rendering modes sometimes led to slow load times or inconsistent UI responsiveness. By experimenting with different modes across CRUD applications, I gained a practical understanding of their trade-offs and learned how to select the most suitable option depending on project requirements.

A recurring issue was encountered in client-server integration. In several instances, the Blazor application failed to retrieve or display data despite the backend API functioning correctly. These errors were often caused by misconfigured service registrations or missing dependency injection in the project setup. Resolving this required careful examination of service lifetimes, configuration files, and API routing logic. Once corrected, the integration worked seamlessly, and I gained confidence in diagnosing and resolving connectivity issues between the client and server layers.

I also faced difficulties with UI framework integration. An attempt to adopt MudBlazor for professional UI design initially failed due to configuration and dependency issues, which prevented components from rendering correctly. This disrupted project timelines and forced me to explore alternative approaches. To ensure progress, I switched to Tailwind CSS for interface development, which allowed me to design responsive layouts quickly. After gaining more experience, I revisited MudBlazor integration and successfully implemented it with the correct setup. This challenge reinforced the importance of flexibility in tool adoption and the ability to adjust workflows to maintain project momentum.

Another challenge related to project structuring and clean architecture. Early project iterations lacked a clear separation of concerns, resulting in tightly coupled code that made debugging and maintenance difficult. For instance, combining business logic directly with UI components reduced modularity and hindered scalability. By researching architectural practices and applying layered design, I restructured projects into distinct modules such as entities, services, controllers, and client components. This restructuring enhanced maintainability, improved clarity, and aligned my work with professional standards of software architecture.

Overall, the challenges I faced during training were not setbacks but opportunities to develop resilience and practical problem-solving skills. Each issue required me to think critically, validate assumptions, and implement corrective measures. By resolving these challenges, I gained deeper insights into real-world software development and strengthened my ability to contribute effectively in professional environments.

## 2.4 Activities performed during the training

### 2.4.1 Knowledge Sharing Sessions

During my training period, I engaged in a variety of activities that not only enhanced my technical proficiency but also strengthened my interpersonal skills and

workplace adaptability. These activities can be broadly categorized into knowledge-sharing sessions and leisure activities.

Throughout the training, I received continuous guidance from senior developers, particularly on Blazor, Tailwind CSS, service-oriented patterns, and the implementation of Data Transfer Objects (DTOs). These sessions were highly interactive and allowed me to connect theoretical academic knowledge with industry-standard practices. Regular team discussions and knowledge-sharing meetings, provided further exposure to real-world IT strategies and collaborative project management.

In addition, I actively participated in code reviews and technical discussions where peers and supervisors exchanged feedback on best practices in coding standards, debugging approaches, and project structuring. These engagements not only strengthened my technical foundation but also significantly improved my communication and collaboration skills, as I learned to articulate technical problems and solutions effectively within a professional setting.

#### 2.4.2 Leisure Activities

Alongside technical engagements, I was also encouraged to participate in non-technical activities that supported team bonding and workplace well-being. One notable event was a fire drill conducted at the World Trade Center, which emphasized the importance of workplace safety and preparedness in case of emergencies.

I also took part in the Company Annual Trip, which provided a much-needed break from routine technical work. This trip played a vital role in reducing stress, enhancing peer relationships, and reconnecting with the natural environment, which in turn promoted mental well-being and improved productivity.

Beyond formal leisure events, I also benefitted from informal peer discussions and self-study sessions, which served as additional platforms for exchanging ideas and refining problem-solving skills outside of structured project work.

## 2.5 Standard Operation Procedures Followed by the Organization with Comparisons to Academic Learnings

During my training, I observed and adhered to several standard operational procedures (SOPs) that ensured consistency, efficiency, and quality in software development. These practices closely aligned with my academic knowledge, while also providing an opportunity to experience how theoretical principles are applied in real-world environments.

### 2.5.1 Data Structures and Algorithms

I applied academic concepts such as sorting, filtering, and pagination in live projects. For example, while developing data-intensive applications, I implemented filtering mechanisms and custom sorting functions to enhance usability. These experiences highlighted how foundational algorithms studied during coursework are directly integrated into production-level systems.

### 2.5.2 Software Engineering Practices

The organization followed industry-standard practices including Clean Architecture, Service-Oriented Patterns, and Git/JIRA-based workflows. These methodologies mirrored much of what I learned in software engineering courses but also added a new dimension through practical application. For instance, applying layered architecture in Blazor applications improved code modularity, maintainability, and scalability, which provided a deeper appreciation of concepts such as separation of concerns and design patterns.

### 2.5.3 Database Practices

My academic knowledge of relational database management systems was reinforced by Entity Framework Core implementations, which included migrations, DbContext configurations, and repository patterns. Furthermore, I learned the practical differences between DbContext (used for domain entities) and IdentityDbContext (used for authentication and authorization), which strengthened my understanding of secure

database management. These practices connected my classroom learnings with actual industry database workflows.

## Chapter 3: Conclusion to the report

The training period has been a transformative journey, offering hands-on exposure to modern software development and operational workflows. It not only strengthened my technical foundation but also highlighted the importance of adaptability, communication, and continuous improvement. This chapter concludes the report by summarizing my suggestions for future development, personal gains, identified weaknesses, and unperformed activities.

### 3.1 Suggestions for Future Development

#### 3.1.1 Personal Development

- Enhance Communication Skills: Continue improving verbal and written communication to effectively interact with teams and future clients.
- Diversify Technical Skills: Expand knowledge beyond backend technologies by gaining experience in frontend frameworks (React, Angular) and DevOps practices.
- Continuous Learning: Keep engaging with cloud technologies, AI/ML, and data analytics to remain competitive in a fast-evolving IT landscape.

#### 3.1.2 Organizational Development

- Structured Training Programs: Implement more structured training modules that provide step-by-step exposure to both backend and frontend technologies.
- Enhanced Knowledge Sharing: Encourage more frequent cross-team workshops to facilitate exchange of expertise between departments.
- Feedback Mechanisms: Introduce structured feedback loops where trainees can share their experiences and suggest improvements to the training program.

## 3.2 Personal Gains and Identified Weaknesses

### 3.2.1 Personal Gains

- Hands-On Experience: The training provided extensive hands-on experience on live projects, bridging the gap between academic theory and professional practice.
- Client Interaction (Indirect): While I did not directly meet clients, I gained exposure to client requirements indirectly through the business excellence teams, who relayed customer expectations and guided implementation.
- Technical Proficiency: I developed strong expertise in backend development using Blazor, Entity Framework Core, and SQL Server, while also gaining experience in UI design through Tailwind CSS and MudBlazor.

### 3.2.2 Identified Weaknesses

- Communication Skills: Although improved, communication remains an area of growth, particularly in professional and client-facing contexts.
- Limited DevOps Exposure: Training primarily focused on backend and frontend development, offering minimal hands-on experience in CI/CD pipelines, automated testing, and containerization.
- Frontend Development Limitations: My work leaned more towards backend, leaving limited exposure to UI/UX design and modern JavaScript frameworks.

### 3.3 Unperformed Activities and Tasks

#### 3.3.1 Activities and Tasks Not Covered

- Frontend Development: Limited engagement with advanced frontend technologies such as React, Angular, or Vue restricted my exposure to complex UI/UX practices.
- Advanced DevOps Practices: While I explored basics of tools like Docker and Kubernetes, I did not cover advanced practices such as continuous integration, deployment pipelines, and cloud infrastructure automation.
- In-Depth Data Analysis: Beyond working with structured datasets, I did not gain deeper exposure to machine learning models or advanced analytical methods, which are increasingly relevant in the software industry.

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## Certification

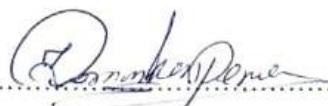
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Training Organization & Address : Variosystems (PVT) LTD, Nelumwaththa, Kotadeniyava Road, 11538, Badalgama  
  
Period : 24 Weeks  
Training period : 17<sup>th</sup> February 2025 to 4<sup>th</sup> August 2025

This is to certify that this report is prepared by myself under the training conducted at the above organization.



Signature of Trainee

This is to certify that this report is prepared by the above trainee under my regular supervision.



Signature of Officer in Charge

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