Requirement Analysis
Technology Stack (Architecture & Stack)

Date	20 June 2025
Team ID	LTVIP2025TMID31451
Project Name	Workforce Administration Solution (dev)

Technical Architecture:

The Workforce Administration Solution (Dev) is designed using a modular, scalable, and secure architecture to manage various aspects of workforce operations, including employee records, attendance tracking, leave management, scheduling, and payroll processing. The system follows a multi-tier architecture with clearly defined layers such as User Interface, Application Logic, Data Storage, and External Integrations.

The solution supports both web and mobile platforms and is built using open-source technologies to ensure extensibility and maintainability. The application is hosted on a cloud-based infrastructure to ensure scalability, availability, and high performance.

➢ **Architecture Overview:**

1. User Interface (Frontend):

Provides an interactive interface for employees, HR managers, and administrators.

Accessible through web browsers and mobile applications.

Built using modern frontend frameworks like React.js, Angular, or Flutter for mobile apps.

2. Application Logic (Back end Services):

Implements core functionalities such as:

Employee Profile Management

Attendance and Leave Tracking

Shift Scheduling

Payroll Processing

Role-Based Access Control

Developed using Java, Python, or Node.js.

3. Database Layer:

Stores structured employee and payroll data in MySQL or PostgreSQL.

Uses MongoDB or Cloudant for semi-structured and log data.

Cloud databases ensure data redundancy and backup.

4. File Storage:

Used for storing payslips, certificates, leave documents, and other employee files.

Implemented using IBM Cloud Object Storage or AWS S3.

5. External API s:

Integrated with:

Aadhaar API for identity verification

Send Grid / Twilio for notifications

GST or tax API s for payroll compliance

Attendance IoT devices (via APIs) for real-time log capture

6. Machine Learning Models (Optional/Advanced):

Used for predictive analytic such as:

Employee Attrition Forecasting

Productivity Trends

7. Infrastructure (Deployment):

Cloud-native deployment using Kubernetes, Docker, or Cloud Foundry.

Hosted on platforms like IBM Cloud, AWS, or Azure.

S.No	Component	Description	Technology
1.	User Interface	Interface for employees/ admins to interact with the system (Web/ Mobile)	HTML, CSS, JavaScript / Angular Js / React Js etc.
2.	Application Logic-1	Employee data management module logic	Java / Python
3.	Application Logic-2	Attendance tracking and leave management logic	Node.js/ IBM Watson IoT for smart attendance devices
4.	Application Logic-3	Payroll and scheduling module logic	Java/ Python/ Spring Boot
5.	Database	Data Storage:Employee records, attendance logs, payroll data	MySQL/ MongoDB.
6.	Cloud Database	Scalable cloud- hosted DB for global access	IBM DB2, AWS, RDS, Cloudant.
7.	File Storage	Storage of payslips, leave applications, etc.	IBM Cloud Object Storage/ AWS S3
8.	External API-1	Integration with government tax on compliance system	AAdhar API, GST API
9.	External API-2	Integration with email/ notification services	SendGrid, Twilio API, WhatsApp API
10.	Machine Learning Model	Attrirtion prediction or workforce planning model	Scikit-learn, IBM Watson ML, TensorFlow
11.	Infrastructure (Server / Cloud)	Hosting on backend services and APIs	IBM Cloud, AWS EC2, Kubernetes, Docker

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology Used
1.	Open-Source Frameworks	Open Source libraries and frameworks used in development	React.js, Node.js, TensorFlow, Flask, Spring Boot
2.	Security Implementations	Authentication, encryption, access control	SHA-256, OAuth 2.0, IAM, JWT, Role-Based Access Control
3.	Scalable Architecture	Architecture designed for scalability across departments or branches	Microservices, Kubernetes, Doocker, Load Balancers
4.	Availability	High availability setup	Cloud Load Balancers, Failover Clustering Redundancy
5.	Performance	Optimized performance for concurrent access, large datasets,etc .	Caching, CDN, DB indexing, Async APIs.