**Proposed Solutions-Template**

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| Date | 24 JUNE 2025 |
| Team ID | LTVIP2025TMID30609 |
| Project Name | workforce administration solution (dev) |
| Maximum Marks |  |

# 1. Core HR & Employee Data Management

**Solution:**

Develop a centralized, role-based HR data repository with APIs for CRUD operations**.**

**Key Features:**

* Employee lifecycle management (hire-to-retire)
* Position and organizational hierarchy mapping
* Document storage (contracts, certifications)
* Role-based access control (HR, managers, employees)

**Tech Stack Suggestion:**

* Backend: Node.js or .NET Core
* Database: PostgreSQL or Microsoft SQL Server
* APIs: RESTful with OpenAPI spec

# 2. Time & Attendance Management

**Solution:**

Build a time-tracking module with geolocation support and rules-based attendance validation.

**Key Features:**

* Clock-in/clock-out (biometric, mobile, kiosk support)
* Timesheet approval workflows
* Overtime and compliance rules engine
* Integration with leave and scheduling systems

**Tech Stack Suggestion:**

* Frontend: React Native (for mobile clock-ins)
* Rules Engine: Camunda or custom engine
* Sync: Bi-directional sync with external payroll or ERP

# 3. Workforce Scheduling

**Solution:**

Create a smart scheduling engine for shift-based or project-based staffing.

**Key Features:**

* Shift templates and drag-and-drop calendar
* Skills- and availability-based assignment
* Conflict resolution (overtime, double-booking)
* Notifications for shift changes or gaps

**Tech Stack Suggestion:**

* Scheduling engine: Python backend with constraint solver (e.g., OptaPlanner)
* UI: React calendar with real-time sync
* Notification: Firebase / Twilio for SMS and email alerts

# 4. Employee Self-Service Portal

**Solution:**

Develop a responsive web and mobile app for employees to manage their HR needs.

**Key Features:**

* Personal data updates
* View payslips and time-off balance
* Submit leave or travel requests
* Access company policies and training

**Tech Stack Suggestion:**

* Frontend: Vue.js or React
* Backend: GraphQL APIs for modular access

# ● Auth: OAuth 2.0 + SSO 🔹 5. Leave & Absence Management

**Solution:**

Implement a configurable leave policy engine integrated with calendars and payroll.

**Key Features:**

* Multi-policy configuration (e.g., sick, vacation, FMLA)
* Accruals, carryover, and approval workflow
* Calendar sync (Google, Outlook)
* Auto-flag attendance impact

**Tech Stack Suggestion:**

* Workflow engine: Camunda or Temporal
* Integration: iCal / Microsoft Graph for calendars
* Leave policies: JSON-configured rules model

# 6. Compliance & Audit Trail

**Solution:**

Add audit-ready logging and compliance configurations across all HR modules**.**

**Key Features:**

* GDPR and labor law compliance tagging
* Role-based visibility and data access logs
* Automated alerts for expiring documents (visas, licenses)
* Exportable audit trail for authorities

**Tech Stack Suggestion:**

* Logging: ELK Stack (Elasticsearch, Logstash, Kibana)
* Monitoring: Prometheus + Grafana
* Data encryption: AES-256 in DB + TLS 🔹 **7. Payroll Integration Layer**

**Solution:**

Build connectors for major payroll platforms or create a staging area for payroll processing.

**Key Features:**

* Pre-payroll report generation
* Sync attendance, overtime, bonuses
* Export formats for ADP, Paychex, etc.
* Audit before submission

**Tech Stack Suggestion:**

* API Layer: Middleware with transformation logic
* Export Engine: CSV/JSON/XLS generator with validation rules

**8. Analytics Reporting Dashboard**

**Solution:**

Develop a real-time reporting dashboard with KPIs for workforce management.

**Key Features:**

* HR metrics (headcount, attrition, leave usage)
* Time & attendance dashboards
* Custom report builder for managers
* Export and schedule reports

**Tech Stack Suggestion:**

* BI Tool: Metabase / Apache Superset / Power BI
* Data Layer: Star schema for workforce data mart
* Reports: Embedded dashboards with RBAC

# Cross-Cutting Concerns

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| --- | --- |
| **Concern** | **Solution** |
| Security | OAuth2.0, RBAC, encryption in transit & at rest |
| Scalability | Containerized services (Docker + Kubernetes) |
| Integration | REST/GraphQL APIs, webhooks, message queues  (Kafka/RabbitMQ) |
| CI/CD | GitHub Actions / Jenkins pipelines |
| Testing | Unit + API + end-to-end tests (Postman + Cypress) |