DriverPass — System Design Document

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1. Executive Summary

DriverPass needs a secure, easy-to-use system that allows students to learn online, schedule in-car lessons, and track progress, while staff and administrators manage accounts, packages, and reporting. This document presents a blended object/process design with UML diagrams and detailed technical requirements suitable for implementation.

2. System Overview

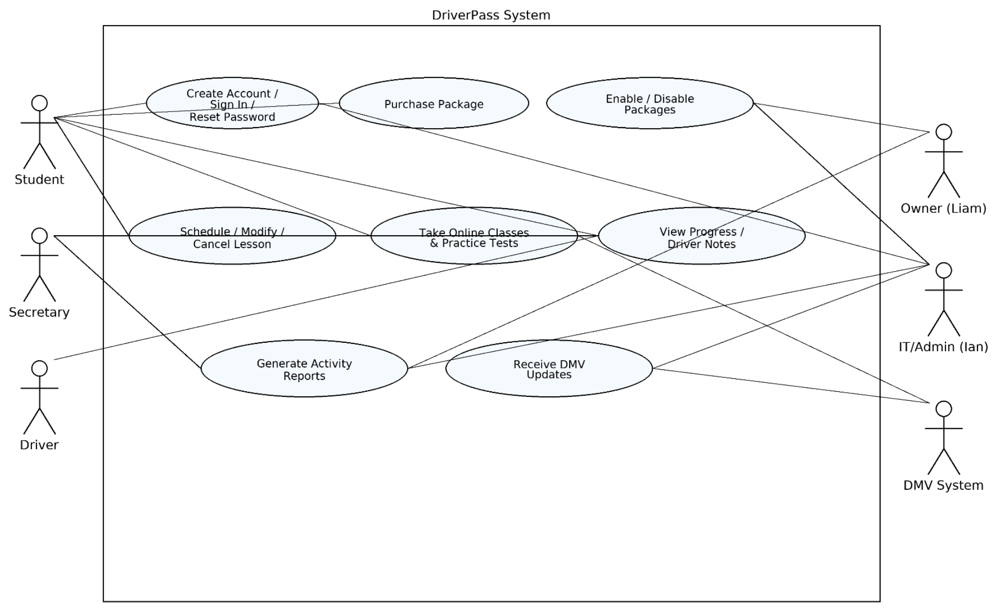
The system provides four pillars of functionality: (1) student learning & assessments, (2) reservation-based lesson scheduling, (3) package catalog and purchase management, and (4) administration & reporting. The design supports web and mobile clients, with a modular backend and a secure data layer.

3. UML Diagrams

3.1 Use Case Diagram

Actors: Student, Secretary, Driver, Owner (Liam), IT/Admin (Ian), DMV System. Key use cases include: account management, package purchase, lesson scheduling, online coursework & practice tests, progress/notes, reports, and DMV updates.

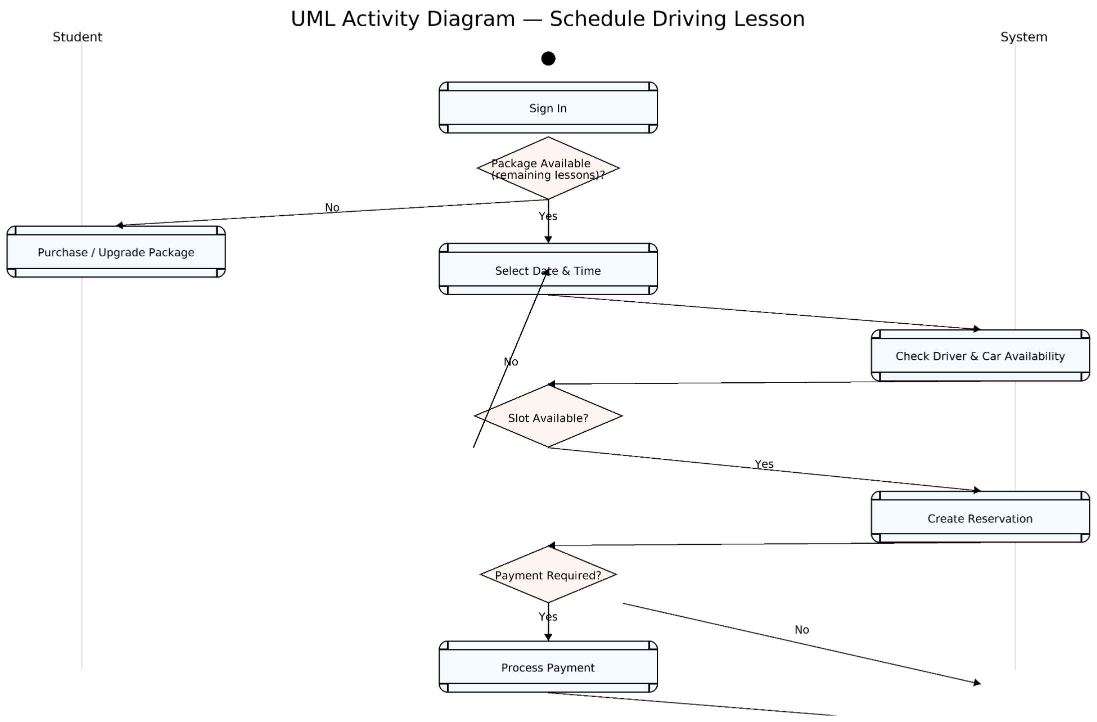
DriverPass — UML Use Case Diagram


DriverPass System
Create Account / Sign In / Reset Password
Purchase Package
Enable / Disable Packages
Student
Owner (Liam)
Schedule / Modify / Cancel Lesson
Take Online Classes & Practice Tests
View Progress / Driver Notes
Secretary
IT/Admin (Ian)
Generate Activity Reports
Receive DMV Updates
Driver
DMV System

3.2 Activity Diagrams

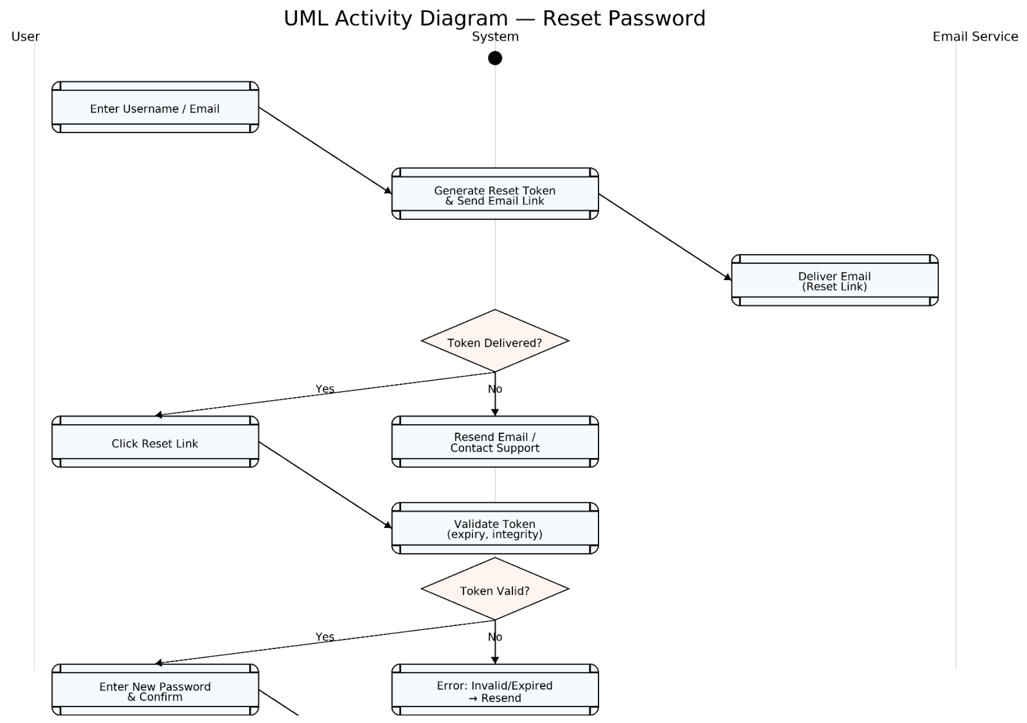
Activity #1 — Schedule Driving Lesson

Start → Sign in → Choose package/remaining sessions → Pick date/time → System checks driver/car availability → Confirm reservation → Send confirmation notification → End.


UML Activity Diagram — Schedule Driving Lesson
Student
System
Sign In
Package Available (remaining lessons)?
No
Yes
Purchase / Upgrade Package
Select Date & Time
Check Driver & Car Availability
No
Slot Available?
Yes
Create Reservation
Payment Required?
Yes
No
Process Payment

Activity #2 — Reset Password

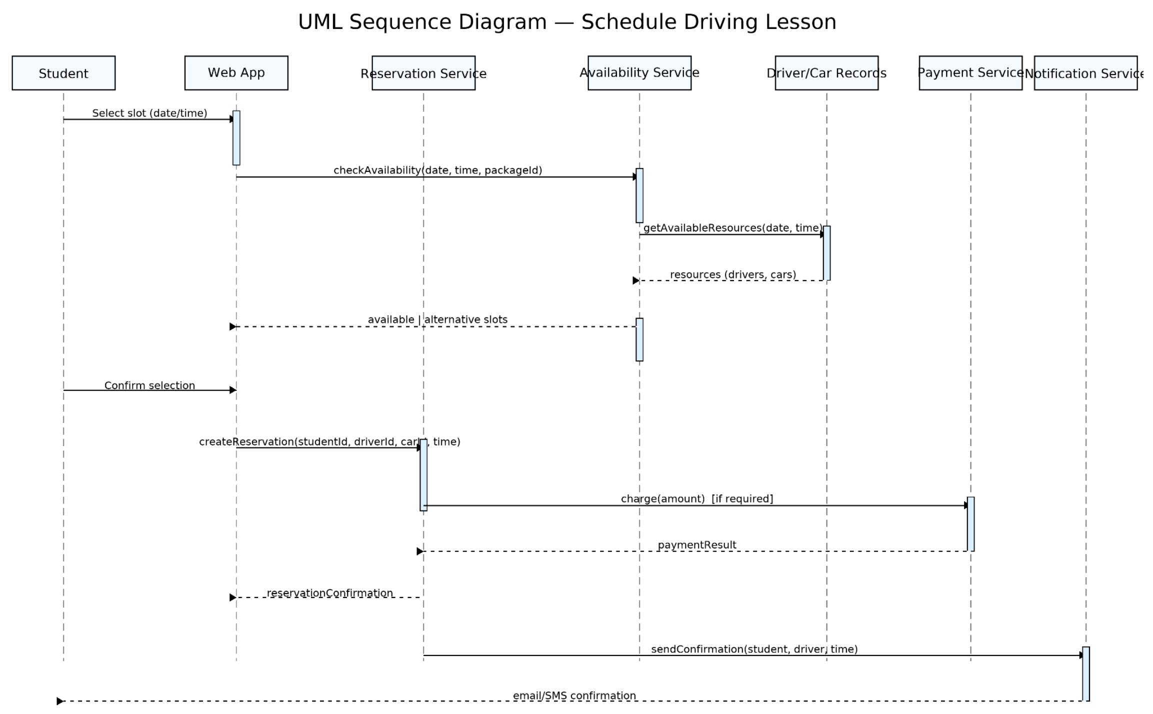
Start → Enter username/email → System sends secure token → User opens link → Enter new password → Validate policy → Update credentials → Confirmation → End.


UML Activity Diagram — Reset Password
User
System
Email Service
Enter Username / Email
Generate Reset Token & Send Email Link
Deliver Email (Reset Link)
Token Delivered?
Yes
No
Click Reset Link
Resend Email / Contact Support
Validate Token (expiry, integrity)
Token Valid?
Yes
No
Enter New Password & Confirm
Error: Invalid/Expired → Resend

3.3 Sequence Diagram (Schedule Driving Lesson)

Lifelines: Student → Web App → Reservation Service → Availability Service → Driver/Car Records → Payment Service → Notification Service.

Happy Path: Student selects slot → Web App requests availability → Availability Service queries driver/car → Reservation Service creates booking → (Optional) Payment → Notification dispatched.

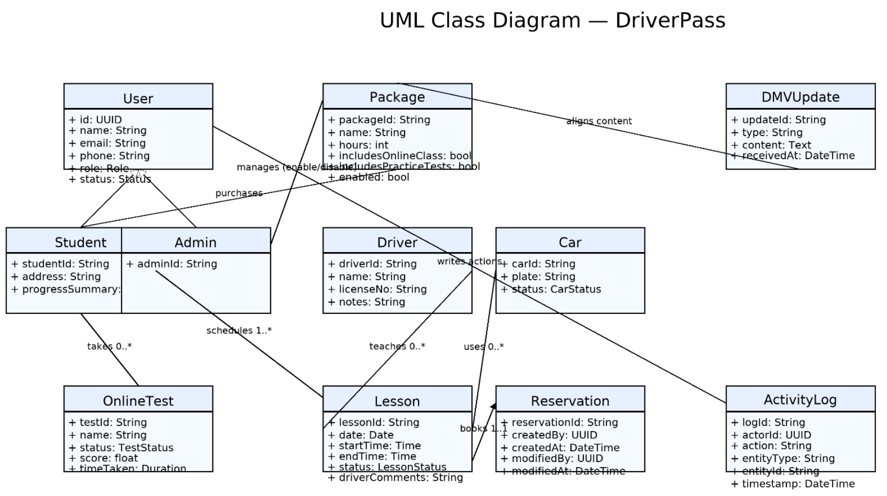

UML Sequence Diagram — Schedule Driving Lesson
Student
Web App
Reservation Service
Availability Service
Driver/Car Records
Payment Service
Notification Service
Select slot (date/time)
checkAvailability(date, time, packageId)
getAvailableResources(date, time)
resources (drivers, cars)
available | alternative slots
Confirm selection
createReservation(studentId, driverId, carId, time)
charge(amount) [if required]
paymentResult
reservationConfirmation
sendConfirmation(student, driver, time)
email/SMS confirmation

3.4 Class Diagram

Core classes and attributes:

- User(id, name, email, phone, role, status)
- Student extends User(studentId, address, progressSummary)
- Admin extends User(adminId)
- Driver(driverId, name, licenseNo, notes)
- Car(carId, plate, status)
- Package(packageId, name, hours, includesOnlineClass, includesPracticeTests, enabled)
- Lesson(lessonId, studentId, driverId, carId, date, startTime, endTime, status, driverComments)
- Reservation(reservationId, lessonId, createdBy, createdAt, modifiedBy, modifiedAt)
- OnlineTest(testId, name, status, score, timeTaken)
- DMVUpdate(updateId, type, content, receivedAt)

• ActivityLog(logId, actorId, action, entityType, entityId, timestamp)



Notes:
— Generalization arrows: Student/Admin inherit from User.
— Lesson links Student, Driver, and Car; Reservation confirms a Lesson.
— Admin manages Packages; Students purchase Packages and take OnlineTests.
— DMVUpdate aligns learning content; ActivityLog records user actions.

4. Technical Requirements

4.1 Software & Tools

• Backend: Java/Spring Boot or C#/.NET 8 (REST), MVC/MVVM
• Frontend: React or Angular (responsive)
• Database: MySQL/PostgreSQL/Azure SQL; ORM (JPA/EF Core)
• Auth: RBAC (Student, Secretary, Driver, Admin/IT, Owner), password policy, optional MFA
• Integrations: DMV updates via webhook/API; email/SMS notifications
• Dev tooling: Git, CI/CD, Lucidchart for UML exports (PNG)

4.2 Infrastructure & Deployment

• Cloud (AWS/Azure/GCP) with managed DB, automatic backups, monitoring
• Environments: Dev, Test, Prod; blue/green deployments; CDN for assets
• Scalability: autoscaling group and load balancer for peak booking windows

4.3 Security Model

• Transport: HTTPS/TLS; Data at rest: encrypted volumes & backups
• Identity: salted password hashing, lockout, optional MFA; secure, tokenized password reset

• Access: RBAC with least privilege; audit trail for create/modify/cancel reservations and account changes
• AppSec: input validation, parameterized queries, CSRF/XSS protections, OWASP Top 10 review

4.4 Nonfunctional Requirements

• Availability: ≥ 99.5% uptime; RPO ≤ 24h, RTO ≤ 4h
• Performance: typical page ≤ 2s; schedule lookup ≤ 1s under normal load
• Scalability: horizontal web tier; read replicas for reporting
• Usability: mobile-friendly UI; clear forms/confirmations
• Maintainability: modular services, code reviews, automated tests

5. RACI & Roles/Permissions

Role	Key Capabilities	R	A	C/I
Student	Enroll, online classes/tests, schedule/cancel lessons, view progress	R		I
Secretary	Assist scheduling, update contact info	R		C/I
Driver	View calendar, add lesson notes	R		I
Admin/IT	Manage users/roles, enable/disable packages, reports	R	A	C/I
Owner	View KPIs/reports,		A	C/I

approve
changes

6. Assumptions, Risks, and Mitigations

• Assumptions: DMV API/webhook access is available; initial packages are defined by IT; internet required for edits.
• Risks: DMV schema changes; peak-time load spikes; account takeover attempts.
• Mitigations: versioned integration, autoscaling and rate limiting, MFA and lockout, continuous monitoring.

7. Glossary

• RBAC: Role-Based Access Control
• MFA: Multi-Factor Authentication
• RPO/RTO: Recovery Point/Time Objective

8. References

DriverPass Interview Transcript; Course templates; Lucidchart exports.